RFP/ER-TM1-93-OU9.2

DRAFT FINAL

TECHNICAL MEMORANDUM NO. 1
VOLUME II - PIPELINES

ADDENDUM TO PHASE I
RFI/RI WORK PLAN
FIELD SAMPLING PLAN

Volume II-A - Text and Appendices

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE
ORIGINAL PROCESS WASTE LINES
(OPERABLE UNIT NO. 9)

U.S. DEPARTMENT OF ENERGY
Rocky Flats Environmental Technology Site
Golden, Colorado

ENVIRONMENTAL RESTORATION PROGRAM

November 1994

RFP/ER-TM1-93\OU9.2

DRAFT FINAL

TECHNICAL MEMORANDUM NO. 1, VOLUME II - PIPELINES

ADDENDUM TO PHASE I
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VOLUME II-A TEXT AND APPENDICES

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE
ORIGINAL PROCESS WASTE LINES
(OPERABLE UNIT NO.9)

Approved by:

Farrel P Hobbs for JAF — Nov 2, 1994
Program Manager — Date

John L. Zimmerman — Oct. 28, 1994
OU9 Manager — Date

[signature] — Nov 2, 1994
Quality Assurance Program Manager — Date

All other required concurrence and approvals on file.

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LIST OF ACRONYMS AND ABBREVIATIONS

Ag	silver
Am	americium
ASTM	American Society for Testing and Materials
Au	gold
Be	beryllium
$C_2H_4O_2$	acetic acid
Ca	calcium
CaF_2	calcium fluoride
CaOH	calcium hydroxide
$CC1_4$	carbon tetrachloride
CCR	Colorado Code of Regulations
Cd	cadmium
CDPHE	Colorado Department of Public Health and Environment
Ce	cerium
CEARP	Comprehensive Environmental Assessment and Response Program
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CHWA	Colorado Hazardous Waste Act
CLP	Contract Laboratory Program
Cm	curium
CMS/FS	Corrective Measures Study/Feasibility Study
Cr	chromium
Cu	copper
d/g/m	disintegrations per gram per minute
d/m/l	disintegrations per minute per liter
DOE	U.S. Department of Energy
DQO	data quality objective
EDL	Economic Discard Limit
EMD	Environmental Management Division
EMO	Environmental Management Office
EPA	U.S. Environmental Protection Agency
Fe	iron
FIDLER	Field Instrument for the Detection of Low Energy Radiation
gph	gallons per hour
gpm	gallons per minute
GPR	ground-penetrating radar
GPS	global positioning system
H_2CrO_4	chromic acid

LIST OF ACRONYMS AND ABBREVIATIONS
(Continued)

H_2SO_4	sulfuric acid
H_3PO_4	phosphoric acid
HCl	hydrochloric acid
$HClO_4$	perchloric acid
HF	hydrofluoric acid
Hg	mercury
HNO_3	nitric acid
HPGe	high-purity germanium
HRR	Historical Release Report
H&S	Health and Safety
IA	Industrial Area
IAG	Interagency Agreement
ID	identification
IDM	investigation-derived materials
IHSS	Individual Hazardous Substance Site
ILDS	International Leak Detection Services, Inc.
IM/IRA	Interim Measures/Interim Response Action
IWCP	Internal Work Control Package
KOH	potassium hydroxide
L	liter
Li	lithium
LiCl	lithium chloride
LO/TO	Lockout/Tagout
mg	milligram
mg/L	milligrams per liter
MgOH	magnesium hydroxide
ml	milliliter
Mn	manganese
Mo	molybdenum
NaI	sodium iodide
NaOH	sodium hydroxide
NH_4OH	ammonium hydroxide
Ni	nickel
OP	operating procedure
OPWL	original process waste lines
OSHA	Occupational Safety and Health Administration
OU	operable unit
PA	Protected Area
PAM	Proposed Action Memorandum

LIST OF ACRONYMS AND ABBREVIATIONS (Continued)

Pb	lead
PCB	polychlorinated biphenyls
PCE	pentachloroethene
pCi/g	picocuries per gram
PID	photoionization detector
ppm	parts per million
PRG	preliminary remediation goal
psig	pounds per square inch gauge
Pt	platinum
Pu	plutonium
PVC	polyvinyl chloride
PWTS	process waste transfer system
QA	quality assurance
QC	quality control
RCA	radiological controlled area
RCRA	Resource Conservation and Recovery Act
RFEDS	Rocky Flats Environmental Database System
RFETS	Rocky Flats Environmental Technology Site
RFI	RCRA Facility Investigation
RFP	Rocky Flats Plant
RI	remedial investigation
Sn	tin
SOP	standard operating procedure
SS	surface soil
Ta	tantalum
TAL	Target Analyte List
Tc	technetium
TCA	trichloroethane
TCE	trichloroethene
TCL	Target Compound List
TOC	total organic carbon
Ti	titanium
U	uranium
VI/SW	visual inspections and site walks
VOA	volatile organic analysis
VOC	volatile organic compound
W	tungsten
WTS	Waste Transfer System
Zn	zinc

1.0 INTRODUCTION

Technical Memorandum No. 1, Pipelines, is submitted in partial fulfillment of the Phase I Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI)/Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Remedial Investigation (RI) Work Plan requirements and presents the initial Stage 1 activities for Operable Unit (OU) 9, the Original Process Waste Lines (OPWL) at the Rocky Flats Environmental Technology Site (RFETS). To expedite the Stage 1 activities, the OPWL investigation has been divided into three parts: (1) tanks outside process buildings, (2) tanks inside process buildings, and (3) pipelines. Volume I of Technical Memorandum No. 1, Part A (U.S. Department of Energy [DOE] 1994a), presented the Field Sampling Plan for tanks located in areas outside large buildings. Tanks located inside buildings will be addressed later, in Part B of Volume I. Volume II (this volume) presents the Field Sampling Plan for investigating pipelines located outside buildings. Pipelines located inside buildings will be addressed later.

This work is part of a comprehensive, multistaged program of site characterization, RIs, feasibility studies, and remedial/corrective actions currently in progress at the DOE RFETS. These activities are in conformity with an Interagency Agreement (IAG) among DOE, the U.S. Environmental Protection Agency (EPA), and the State of Colorado Department of Health, now known as the Colorado Department of Public Health and Environment (CDPHE) and addresses RCRA, CERCLA, and Colorado Hazardous Waste Act (CHWA) issues. Further information on the investigation at OU9 is contained in the OU9 *Phase I RFI/RI Work Plan* (DOE 1992a).

The text of Technical Memorandum No. 1, Volume II, Pipelines, is divided into eight subsections. Section 1.0 describes the background, purpose, and scope of the Stage 1 OU9 OPWL field investigations. Section 2.0 discusses the preliminary field activities (data compilation, site walks, and surface radiation surveys). Section 3.0 describes the pipelines. Section 4.0 describes the overall approach to the pipeline investigation, the rationale for sample locations, and sampling techniques. Section 5.0 summarizes field procedures. Section 6.0

describes the laboratory sample analysis. Section 7.0 details the schedule for fieldwork. Section 8.0 lists the references.

1.1 BACKGROUND

The OPWL was first identified as an RCRA-regulated unit in mid-1986. Shortly thereafter, an interim status closure plan for the OPWL (Closure Plan) was prepared (DOE 1986b) pursuant to Part 265 of the Colorado Hazardous Waste Regulations (6 Colorado Code of Regulations [CCR]) and Title 40, Part 265 of the Code of Federal Regulations (40 CFR), and in accordance with the Compliance Agreement for RFETS finalized by representatives of DOE and EPA on July 31, 1986. The Closure Plan was revised in late 1988 (DOE 1988).

In late 1986, Phase I of the DOE Comprehensive Environmental Assessment and Response Program (CEARP) was performed at RFETS. The CEARP investigations were initiated to characterize RFETS release sites, including the OPWL.

On January 22, 1991, DOE, EPA, and the State of Colorado entered into a Federal Facilities Agreement and Consent Order, commonly known as the IAG (DOE et al. 1991). The IAG establishes the work and schedule for the RFI/RI and Corrective Measures Study/Feasibility Study (CMS/FS) response process at RFETS. OU9 currently is in the Phase I RFI/RI stage.

The OU9 OPWL pipeline comprises approximately 35,000 feet of underground pipeline. Approximately 13,000 feet of the pipelines are located beneath buildings, and approximately 7,000 feet are beneath concrete or asphalt pavement. At least half of the remaining length is located in areas highly congested with other active and inactive utility lines (DOE 1992a).

The OU9 pipeline is designated as individual hazardous substance site (IHSS) 121 and is composed of 66 pipeline designations and five pipeline spurs. The OU9 RFI/RI Work Plan (DOE 1992a) lists 57 designations; however, nine additional pipeline locations and five additional pipeline spurs were identified during data compilation and site walks conducted in January through March 1994. OPWL pipeline designation numbers, duplicate IHSS numbers, and other information are listed in Table 1-1. Plates 1 through 15 (bound separately) provide a visual confirmation of the location of these pipelines in the Industrial Area (IA). Table 1-2 provides a location index by which the reader may easily reference a pipeline to the appropriate plate(s). Plate 1 also provides this pipeline index.

The regulatory status of the OPWL pipelines falls into one of the following categories:

- physically removed (subject to investigation under this Work Plan);

- abandoned in place (subject to investigation under this Work Plan);

- incorporated into the new transfer system as permitted hazardous and mixed radioactive waste tank and pipeline systems under the RCRA Part B Hazardous and Mixed Waste Operating Permit Application for RFETS (will not be part of this RFI/RI);

- incorporated into the new process waste system on an interim status as hazardous and mixed radioactive waste tank and pipeline systems under the RCRA Part B Hazardous and Mixed Waste Operating Permit Application for RFETS (will not be part of this RFI/RI);

- incorporated into the new process waste system as 90-day transuranic mixed waste tank and pipeline systems under the RCRA Part B Transuranic Mixed Waste Operating Permit Application for RFETS (will not be part of this RFI/RI); and

- incorporated into the RFETS exhaust plenum fire deluge system (will not be part of this RFI/RI).

As listed in Table 1-1, all or portions of pipelines P-1, P-7, P-54, and P-56 have been converted to the new process waste transfer system and two other pipelines (P-23 and P-30) have been converted for use as a fire plenum deluge water discharge system. Based on information obtained through preliminary OPWL investigative activities, it was determined that pipelines P-8, P-18, and P-57 are not valid designations; no known pipelines exist at these locations. Five pipeline spurs (P-20.1, P-30.1, P-30.2, P-34.1, and P-41.1) and nine new pipelines (P-58 through P-66) have been identified through data compilation and site walk activities (Section 2.0). P-62 is being addressed under the operational closure (RCRA deletion) of Building 559 complex process waste tank system and ancillary equipment. Portions of pipelines P-26, P-35, P-36, P-37, P-41, P-46, P-47, P-48, P-49, and P-50 are planned for removal as part of the interim measures/interim remedial action (IM/IRA) for the Solar Ponds (OU4).

The investigation of pipelines that are active waste management units will not be investigated as part of this RFI/RI because their structures and associated soils will be addressed at the time of their closure in accordance with the RCRA Part B permit applications for RFETS (DOE 1986b; DOE 1987). The investigation of pipelines converted to the exhaust plenum fire deluge system will be deferred until they are no longer actively used. Some abandoned pipelines beneath buildings cannot be practically investigated at this time because of the nature of RFETS and the potential for disruption of operations. The remaining outside pipelines and any newly identified pipelines, with the exception of OU4 (Solar Ponds) field activities, will be investigated as described in this document.

The general function of the OPWL pipeline was to transfer process waste from facilities generating waste to the Building 774 treatment facility. The OPWL was put in service when RFETS began production in 1952 (DOE 1992b). Repairs and additions were made to the system through 1975. From 1975 to 1984, the OPWL pipeline was replaced by a separate double-contained, fully inspectable process waste system. OPWL pipelines that were not replaced or removed were largely abandoned in place.

JACOBS ENGINEERING GROUP INC.

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October 16, 1995

Mr. Bruce Peterman
Rocky Mountain Remediation Services LLC
Rocky Flats Environmental Technology Site
PO BOX 464
Golden, CO 80402-0464

Subject: **Submittal of Five Copies of the OU9 Data Summary Report**
Reference: **Master Task Subcontract No. MTS225450SG**
Task Order Contract No. MTS225450001SG/TB3

Dear Mr. Peterman:

Enclosed please find five volume sets (Volume I, II, and III) of the OU9 Final Data Summary Report. Volume I consists of the text, tables, figures and plates. Volume II contains Appendix A-E, and Volume III contains Appendix F.

This report was written to provide comprehensive coverage of the historical, investigative, and analytical results for each of the OU9 eleven tank groups investigated under this task order. In some cases, however, analytical results were not completed through the RFEDS data system and were therefore not incorporated into this report. However, in these cases, the raw analytical data is provided in Appendix E to allow the reader to determine "order of magnitude" concentrations. Missing RFEDS results is most prudent on tank groups where high radiological activity was encountered, and restrictions in shipping samples limited laboratory analyses to onsite laboratories, such as the laboratories in Buildings 371 and 559. These conditions occurred primarily on Tank Groups T-9 and T-10, and T-14 and T-16, with actual tank contents samples, such as, water, sludge, sediment.

With the delivery of this report, the remaining project hours (minimal hours are remaining) will be focused on close-out activities, such as file closure and final invoice payment.

Should you have any questions concerning this report, please contact me at (303) 595-8855 or Farrel Hobbs.

Sincerely,
JACOBS ENGINEERING GROUP INC.

John L Zimmerman

John Zimmerman
OU9 Project Manager

cwebster/datasum.doc

Encl. 5 sets

cc: Project File
EM Records Center
Farrel Hobbs

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November 2, 1994

05H60209

Mr. Craig Cowdery
Rocky Flats - Interlocken
EG&G Rocky Flats
P.O. Box 464
Golden, CO 80402-0464

Subject: **Submittal of 12 Copies of Draft Final Technical Memorandum No. 1, Addendum to Phase I RFI/RI Work Plan, Field Sampling Plan for Original Process Waste Lines, Volumes II-A and II-B**

Ref: **Master Task Subcontract No. MTS225449RR; Task Order Contract No. MTS237441GG3**

Dear Craig:

Provided as Enclosure (1) are 12 copies of the Draft Final Technical Memorandum No. 1 Addendum to Phase I RFI/RI Work Plan, Field Sampling Plan for Original Process Waste Lines, Volumes II-A and II-B. Please note that Volume II-A includes the Field Sampling Plan text, tables, figures, and appendices; and Volume II-B includes reference plates.

Enclosure (2) consists of Jacobs' response to written comments received through you from EG&G's review of the Draft Volume II documents. This should facilitate review of each reviewers "general" and "mandatory" comments and Jacobs' response to each.

If you have any questions regarding this deliverable or any other matter, please contact me at your convenience.

Sincerely,

JACOBS ENGINEERING GROUP INC.

John Zimmerman
OU9 Project Manager

Farrel Hobbs
Project Manager
Denver Operations

l-cowde2

PRINTED ON RECYCLED PAPER

Encls: (1) 10 copies of Draft Technical Memorandum No. 1 Addendum to Phase I RFI/RI Work Plan, Field Sampling Plan for Original Process Waste Lines, Volumes II A and B.

(2) Response to Draft Volume II comments

cc: Bruce Peterman - (w/o enclosures)
Gabriele Greene - (w/o enclosures)
Project File
ERM Records

l-cowde2

The OPWL was used to transport various aqueous process wastes containing low-level radioactive materials, nitrates, caustics, and acids. Small quantities of other liquids were also handled in the system, including pickling liquor from foundry operations, medical decontamination fluids, miscellaneous laboratory wastes, and laundry effluent. Certain process waste streams also contained metals, volatile organic compounds, oil and grease, and cleaning compounds (DOE 1992a).

1.2 PURPOSE AND SCOPE

The objective of the OU9 Technical Memorandum No. 1, Pipelines is to generate sufficient and adequate data to satisfy the Phase I RFI/RI objectives described in Section 4.0 of the OU9 *Phase I RFI/RI Work Plan* (DOE 1992a).

Searches for the locations of original process waste lines were conducted for the preparation of the Closure Plans and for the *Phase I RFI/RI Work Plan* (DOE 1992a). The OPWL-related RCRA Closure Plan work in 1986 and 1988 relied heavily on personnel interviews and limited review of available OPWL-specific documents such as the *Survey of the Status of Existing Process Waste Lines* (Rockwell International, Inc. [Rockwell] 1976) and a previous engineering project that investigated the possible costs associated with removal of the OPWL system.

During the preparation of the 1986 and 1988 RCRA Closure Plans, time was limited. Therefore, if the existence of an OPWL line or tank was alluded to in an interview, the personnel working on the closure plans included the information even if evidence verifying the existence of that tank or line could not be found. Furthermore, in many instances, no attempt was made to verify the existence or actual alignment of pipes described in interviews. The personnel working on the closure plan projects typically transferred an alignment indicated by an interviewee onto the closure plan drawing without further research. At the time, the closure plan personnel believed that this approach was more conservative (protective of human health and the environment) and that subsequent OPWL activities would confirm or deny the actual existence of these possibly nonexistent tanks and lines. Thus, based on the history of the OPWL project, it is to be expected that nonexistent pipes or inaccurate alignments of some pipes will be identified.

It was known during preparation of the RCRA Closure Plans that additional work would need to be done to better ascertain location and presence of the OPWL system. Although some new work regarding the operations and history of the OPWL was done for preparation of the *Phase I RFI/RI Work Plan*, most of this work consisted of reviewing available information in a more complete and thorough fashion.

For the purposes of this report, data compilation activities conducted from November 1993 to February 1994 primarily involved research using materials not accessed during preparation of the RCRA Closure Plans and the *Phase I RFI/RI Work Plan* (DOE 1992a).

Since 1988, a number of sources of information have been identified that significantly increased the level of understanding of the OPWL system. The integration of newly identified engineering drawings obtained in 1993 and 1994 allows a more complete understanding of the OPWL system. The focus of the initial pipeline investigation includes the structural features of pipelines that may have leaked wastes to the underlying soils. Thus, the results of data compilation were used to clarify the existence, physical characteristics, and, in some cases, the location of OU9 pipelines.

The Stage 1 sampling activities for the OPWL pipeline are based on the results of recent data compilation activities (Section 2.1) and are designed to detect points of contamination in OU9 vadose zone soils and to provide an assessment of the nature of contamination at these locations. Where groundwater is encountered during Stage 1 activities, the saturated zone will be assessed to a limited extent. Sampling locations selected for investigation will represent the most probable sites of contamination based on the release scenarios developed in the conceptual model and additional information reviewed during the data compilation activities.

In general, Stage 1 field activities for the OPWL pipeline consist of the following:

- confirmation of pipeline existence, location, and configuration;
- determination of pipeline condition;
- collection of surface soils samples;
- collection of pipeline backfill material samples;
- collection of native soils beneath the pipeline samples;
- collection of groundwater samples, if encountered; and
- collection of residue or wipe samples from the pipeline.

Stage 1 field activities are discussed in detail in Section 4.0. Stage 2 sampling activities will be the subject of future technical memoranda that will describe the results of Stage 1 sampling and propose subsequent investigation of contaminated sites identified during Stage 1. Future Stage 3 activities will be used to characterize the vertical and lateral extent of contamination.

The OU9 investigation is being integrated with the investigation of other RFETS Industrial Area OUs including OUs 8, 10, 12, 13, and 14. Appendix A contains the schedule of activities showing potential overlapping of field investigations and OU9 activities.

The integration will (1) facilitate consistency and quality of data collection, (2) identify areas of overlap, (3) reduce redundancy in the investigations of the sites, and (4) ensure more efficient use of resources for field sampling. An *Integrated Field Sampling Plan* for the Industrial Area OUs 8, 9, 10, 12, 13, and 14 was prepared in April 1994 (DOE 1993a).

TABLE 1-1
Summary of Pipeline Description
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

PIPELINE DESIGNATION NO.	DUPLICATE IHSS NO.	BUILDING	DATE INSTALLED	DATE ABANDONED	COMMENTS
P-1	NA	123	1968	Jun-82	(1) Portion is active PWTS permitted as an RCRA interim status pipeline system (DOE 1987)
P-2	NA	123	1952	Jun-82	
P-3	NA	123	1952	Jun-82	
P-4	NA	123, 441, 444	1952	Apr-81	
P-5	NA	444	1952	Apr-81	
P-6	NA	881	1953	Dec-80	
P-7	NA	881	1952	N/A	(1) Active PWTS permitted as an RCRA interim status tank and pipeline system (DOE 1987)
P-8	NA	881	1952	Dec-80	Invalid location
P-9	NA	883	1957	Mar-84	
P-10	NA	865/889	1968	May-82	
P-11	147.1	123,441,444,881, 883,865,889	52/75	Mar-84	
P-12	123.2, 147.1, 150	123,441,444,881, 883,865,889	1952	1975	
P-13	123.2, 147.1, 150	123,441,444,881, 883,865,889	1975	Mar-84	
P-14	123.2, 150	123,441,444,881, 883,865,889	1952	1968	
P-15	123.2, 150	123,441,444,559, 881,883,865,889	1968	Mar-84	
P-16	NA	559	1968	Jul-82	
P-17	159	559	1968	Jul-82	
P-18	NA	559	1968	Jul-82	Invalid location
P-19	NA	707	1968	Mar-84	
P-20	NA	123,441,444,881, 883,889,865,559, 707,729	1968	Mar-84	
P-20.1	NA	729	1968	1977	

TABLE 1-1 (continued)
Summary of Pipeline Description
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

PIPELINE DESIGNATION NO.	DUPLICATE IHSS NO.	BUILDING	DATE INSTALLED	DATE ABANDONED	COMMENTS
P-21	NA	123,441,444,881, 883,889,865,559, 707,729	1952	Mar-84	
P-22	NA	771	1952	May-82	
P-23	NA	771	1969	May-82	(2) Firewater plenum deluge system
P-24	NA	771	1966	May-82	
P-25	NA	771	1972	May-82	
P-26	149.1, 149.2	774	1972	70s	(3) Overlaps with OU4
P-27	NA	774	1952	1982	
P-28	127	774	1952	1982	
P-29	127	774	1952	1982	
P-30	NA	776/777	1957	Oct-82	(2) Portion is firewater plenum deluge system
P-30.1	NA	776/777	1957	1981	
P-30.2	NA	776/777	1981	1982	
P-31	NA	771/774	1952	1983	
P-32	NA	778	1957	Dec-82	
P-33	NA	771	1952	1972	
P-34	NA	771	1952	1972	
P-34.1	NA	771	1952	1965	
P-35	NA	774,776,777,778	1952	1982	(3) Overlaps with OU4
P-36	NA	100,800,400,500	1965	Dec-82	(3) Overlaps with OU4
P-37	NA	776,777,778,779	1957	Dec-82	(3) Overlaps with OU4
P-38	NA	703,774,776,777 778,779	1952	Dec-82	
P-39	NA	703,774,776,777 778,779	1952	Dec-82	
P-40	NA	703,774,776,777 778,779	1972	Dec-82	

TABLE 1-1 (continued)
Summary of Pipeline Description
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

PIPELINE DESIGNATION NO.	DUPLICATE IHSS NO.	BUILDING	DATE INSTALLED	DATE ABANDONED	COMMENTS
P-41	NA	776,777,778	1957	Dec-82	(3) Overlaps with OU4
P-41.1	NA	776/777/778	1957	1969	
P-42	NA	779	1957	Dec-82	
P-43	NA	776,777,778	1969	Dec-82	
P-44	NA	100,400,500, 800,700	1969	Dec-82	
P-45	NA	703	1966	Unknown	
P-46	NA	774	1952	1982	(3) Overlaps with OU4
P-47	NA	Ponds 207A & 207C	Unknown	Unknown	(3) Overlaps with OU4
P-48	NA	Ponds 207A & 207C	Unknown	Unknown	(3) Overlaps with OU4
P-49	NA	Ponds 207A & 207C	Unknown	Unknown	(3) Overlaps with OU4
P-50	NA	Ponds 207A & 207B	Unknown	Unknown	(3) Overlaps with OU4
P-52	NA	443	Unknown	Unknown	Not part of OPWL
P-53	NA	881	1952	1976	
P-54	NA	881	1952	Unknown	(1) Active PWTS permitted as an RCRA interim status tank and pipeline system (DOE 1987)
P-55	NA	881	1952	1976	
P-56	NA	771/774	1983	1990	(1) Active PWTS permitted as an RCRA interim status tank and pipeline system (DOE 1987)
P-57	NA	122	1952	NA	Invalid location
P-58	NA	100,400,500,800 700 AREAS	1952	1969	Newly identified
P-59	NA	774	1952	1969	Newly identified
P-60	NA	774	1952	1970	Newly identified
P-61	NA	774	1952	1982	Newly identified

TABLE 1-1 (continued)
Summary of Pipeline Description
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

PIPELINE DESIGNATION NO.	DUPLICATE IHSS NO.	BUILDING	DATE INSTALLED	DATE ABANDONED	COMMENTS
P-62	NA	559	1976	Unknown	(1) Newly identified. Pipeline is being addressed under the operational closure (RCRA deletion) of Building 559 complex process waste tank system and ancillary equipment.
P-63	NA	886	1963	Unknown	Newly identified
P-64	NA	886	1963	Unknown	Newly identified
P-65	NA	886	1963	Unknown	Newly identified
P-66	NA	886	1977	Unknown	Newly identified

Notes: IHSS = Individual Hazardous Substance Site
PWTS = part of new process waste transfer system
OU4 = Operable Unit No. 4 - Solar Ponds

(1) Those portions of this pipeline that are designated as part of the PWTS are not subject to investigation under Technical Memorandum No. 1, Volume II.
(2) Those portions of this pipeline that have been converted to fire plenum use are not subject to investigation under Technical Memorandum No. 1, Volume II.
(3) Those portions of this pipeline that have also been identified under the OU4 closure will be investigated under OU4 and are, therefore, not included in Technical Memorandum No. 1, Volume II.

TABLE 1-2
OU9 Pipeline/Plate Reference Index
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

PIPELINE NO.	PLATE NO(s).	PIPELINE NO.	PLATE NO(s).	PIPELINE NO.	PLATE NO(s).
P-1	11	P-32	3,6	P-65	14
P-2	11	P-33	3	P-66	14
P-3	11	P-34	3		
P-4	11,12,13,14	P-34.1	3		
P-5	12	P-35	3		
P-6	14,15	P-36	3,4		
P-7	15	P-37	3,4,7		
P-9	14	P-38	3,4,7		
P-10	14	P-39	7,8,9		
P-11	10,14	P-40	8,9		
P-12	10	P-41	3,6		
P-13	10	P-41.1	3		
P-14	6,10	P-42	3,6		
P-15	6,10	P-43	3		
P-16	5,6	P-44	3		
P-17	5	P-45	3		
P-19	6	P-46	3		
P-20	3,6	P-47	4		
P-20.1	6	P-48	4		
P-21	3	P-49	4		
P-22	3	P-50	4		
P-23	2,3	P-53	15		
P-24	3	P-54	15		
P-25	3	P-55	15		
P-26	3,4	P-56	3		
P-27	3	P-58	3		
P-28	3	P-59	3		
P-29	3	P-60	3		
P-30	3	P-61	3		
P-30.1	3	P-62	5		
P-30.2	3	P-63	14		
P-31	3	P-64	14		

2.0 PRELIMINARY FIELD ACTIVITIES

Preliminary field activities for the Stage 1 investigation of the OPWL pipeline include data compilation, site walks, and surface radiation surveys. The preliminary field activities were fundamental in the development of the rationale and approach for the proposed field investigation effort. These activities are described in the following sections.

2.1 DATA COMPILATION

The data compilation task for OPWL pipeline was conducted for verification of pipeline locations, structural features, and current status and identification of historical releases that were not previously documented in the *OU9 RFI/RI Work Plan* (DOE 1992) or Post Closure Plan, (DOE 1988).

The specific objective of the OPWL pipeline data compilation task is to focus the investigation of OU9 to accomplish the following:

- Identify any OPWL pipelines and tanks that were not identified in the OPWL Closure Plan (DOE 1988).

- Identify OPWL pipelines that have been converted to the new process waste transfer system. These pipelines will be addressed under their respective RCRA permits rather than as part of the OU9 RFI/RI.

- Identify active OPWL pipelines that do not hold active permits.

- Identify OPWL pipelines that have been converted to the Fire Plenum Deluge System.

- Identify OPWL pipelines that have been modified, repaired, replaced, or removed.

- Identify historical OPWL discharge points.
- Determine waste flow directions in individual OPWL pipeline segments.
- Identify OPWL pipelines that were pumped (force flow) lines.
- Identify OPWL pipeline structural features (e.g., valves, valve vaults, pumps, lift stations, manholes, elbows, and tees).
- Identify known OPWL release sites.
- Improve OPWL waste stream characterization.
- Determine dates of operation for OPWL pipeline and tanks.
- Evaluate potential logistical problems associated with field investigation activities.
- Evaluate the feasibility of partial investigation of OPWL pipelines and tanks located beneath buildings.

The sources of information for verifying pipeline locations and current status for the data compilation task were historical engineering drawings of the OPWL located in the RFETS engineering drawing room in Building 130 and in several of the buildings serviced by the OPWL. Other sources of information that were explored but did not prove as valuable as the engineering drawings included photographic files, site-survey reports, and engineering job authorization files housed at the National Archives Building at the Denver Federal Center.

The RFETS engineering drawing room contains thousands of engineering drawings on microfilm. The drawings are numbered and catalogued in binders that provide cross references between drawings, the buildings, and the type of engineering construction or modification. During the search for OPWL pipeline engineering drawings, the general utilities sections for utilities and plumbing were searched building-by-building using the key words "process," "process waste," "waste," "tanks," and "piping." Foundation plans for key buildings were scrutinized to determine whether OPWL were identified. Drawings associated with OPWL tanks were also reviewed for their connections into pipelines.

Accurate and revised plan and profile drawings of most of the OPWL pipelines are not available. Some of the original 1950s drawings may have been destroyed as a result of security programs. In many of these cases, drawings showing portions of the OPWL were created in the 1970s for pipeline modifications. The drawings collected during data compilation were utility drawings (plant-wide drawings that show the location of all major utility lines) and engineering drawings. Some of these show profiles or spot invert elevations. In many instances, existing information is not sufficiently detailed to determine the exact depth or invert elevation of the pipeline and structural features.

In some cases, engineering drawings provide conflicting information. Some engineering drawings indicate a horizontal alignment different from the alignments provided in the Work Plan. Additionally, while some information on pipeline construction, materials, and location was taken from as-builts, other information was taken from general construction drawings where construction may or may not have been completed as drawn. Discrepancies between engineering drawings are identified in Section 3.0. The discrepancies will be resolved during the pipeline field investigations.

No documentation was found for some of the pipeline designations found in the Work Plan. As a result of further investigative work conducted under the preliminary field activities, these are considered invalid pipeline designations.

A second aspect of the data compilation task was to identify historical releases that were not documented in the *OU9 RFI/RI Work Plan* (DOE 1992) or Post Closure Plan (DOE 1988). Sources of information for identifying historical releases from OPWL pipeline were the *Historical Release Report* (HRR) (DOE 1992b), the International Leak Detection Services, Inc. (ILDS), History Reports for the Process Waste Disposal Group (Ryan 1962 a,b,c; 1963; 1964), the Waste Disposal Coordination Reports (Ryan, August 1961 through August 1965), and the HRR database. The results of this task were incorporated into the line-by-line summaries discussed in Section 3.0.

The following is a brief description of the OPWL. The OPWL was a network of tanks, underground pipelines, and some aboveground pipelines that were constructed to transport and temporarily store aqueous chemical and radioactive process wastes from the point of origin to onsite treatment and discharge points. It was not a continuously flowing system but operated as a batch transfer system. Wastes accumulated at or near the building of origin in waste holding tanks. When these tanks neared capacity, the waste operations personnel in Building 774 were contacted. Before transfer of the process waste, an analysis of the waste was made. This analysis was forwarded to Building 774, and a request was made for permission to transfer the waste. When permission was obtained, the pipeline was opened to allow the process waste to flow to either the treatment facility, the solar evaporation ponds, or Pond B-2. Initially, process waste was designed to go directly from the production area to the treatment area. As production at RFETS increased, pumps and valves were added to establish a "Lock Out/Tag Out (LO/TO)" system. This system allowed only Building 774 personnel to make the transfer.

The process waste system handled process waste from throughout the IA. Methods of handling wastes changed through the years as (1) RFETS and its operations evolved, and (2) the acceptable levels of radioactive and other contamination for offsite discharge also changed. Major changes occurred in the mid-1960s and in late 1972. In the mid-1960s, Building 774 operations were supplemented with an organic treatment system that created a "grease " or "jelly" from liquid solvents and oils. The characteristics of this "jelly" made it suitable for offsite shipment (the shipment of radioactive liquids was prohibited). Building 774 operations were also supplemented in the mid-1960s with an evaporator that treated radiological wastes. The steam from this evaporator was recondensed, sampled to ensure that it met acceptable levels, and then discharged to the drainage leaving RFETS.

In late 1972, some of the RFETS drainage ponds were provided with bypass lines so that the ponds did not need to be operated strictly in series. In particular, on December 21, 1972, drainage ponds A-2 and B-2 were taken off-line with respect to stream drainage flow and dedicated to the management of Building 774 discharges. Discharges from Building 774 were routed to Pond B-2; from Pond B-2, water could be transferred through a 6-inch line to Pond A-2. Spray evaporation of the water occurred at Pond A-2 to minimize the amounts of Building 774 water discharged offsite. For a certain period, discharges from Building 774 and some laundry decontamination water that were low in radioactive activity were discharged to the sanitary wastewater treatment plant. These discharges to the sanitary wastewater treatment plant were made because it had been determined through a series of experiments that additional removal of radionuclides was achieved through the activated sludge treatment process used by the sanitary wastewater treatment plant (Building 995).

Process wastes having a level of radioactivity higher than the Economic Discard Limit (EDL) would be sent through a recovery process for removal of plutonium-239 or uranium-235. If the levels of activity were lower than the EDL, the wastes were routed to Building 774 for treatment, primarily by a precipitation process to remove the radioactivity. After the activity was lowered to discharge limits, the wastes were typically discharged from Building 774 to the South Walnut Creek drainage near Building 995 and Pond B-2. However, if the levels of activity in the waste received at Building 774 were low enough, the waste could be sent to the Solar Ponds for treatment by evaporation.

A summary of Building 774 acceptance criteria, Solar Pond acceptance criteria, and discharge criteria are presented in the following sections.

- Before October 1953:
  - Laundry waste less than 10,000 disintegration per minute per liter (d/m/l) was discharged to the sanitary sewer in place of treatment at Building 774.
  - Building 774 effluent level of activity limit was 10 percent of the drinking water limit.
- October 1953:
  - Building 774 discharge level of activity was raised from 10 percent to 25 percent of the drinking water limit. This level was considered acceptable until the effluent of the lower pond showed an activity level approaching 10 percent of the drinking water limit.
- February 1954:
  - The activity level for laundry waste discharged to the sanitary sewer was reduced form 10,000 d/m/l to 8,500 d/m/l.
- June 1972:
  - A Survey of the Rocky Flats Division Waste Streams presented criteria for process waste streams for buildings that handled uranium:
  - If the activity level was greater than 35,000 d/m/l, the waste stream was sent to Building 74 second stage operations.
  - If the activity level was less than 35,000 d/m/l but nitrate was 45 parts per million (ppm) or chromium (as chromate) greater than 2.5 ppm, then the water was sent to Pond 107.
  - If the concentrations were below the criteria in either or both of the first two, then the waste stream was sent to the sanitary sewer.

- The report also presented criteria for process waste streams for buildings that handled plutonium:

  - If the activity level was greater than 3,500 d/m/l, the waste stream was sent to Building 74 second-stage operations.

  - If the activity level was less than 3,500 d/m/l but nitrate was greater than 45 ppm or chromium (as chromate) greater than 2.5 pm, then the water was sent to Pond 207.

  - If the concentrations were below the criteria in either or both of the first two, then the waste stream was sent to the sanitary sewer.

The OPWL was placed in service when RFETS began production in 1952 (DOE 1992b). Some of the original lines were double-contained lines that included lampholes that allowed for inspection to see if liquid was present in the outer line. Repairs and additions were made to the system through 1975 (DOE 1992b). Beginning in 1975, the OPWL system was replaced by a double-contained, fully inspectable process waste system. This new process waste system was completed in the summer of 1984 (DOE 1992b). Some tanks and pipelines from the OPWL were incorporated into the new process waste system and into the RFETS exhaust plenum fire deluge system (DOE 1992b). In some cases, flexible tube was pushed through the existing OPWL, leaving the original line as a secondary containment.

Some of the OPWL pipelines were removed during the late 1970s and early 1980s. This work was primarily performed as part of a program called "Replace Uninspectable Process Waste Systems." The OPWL pipelines not removed and not converted to the new process waste system have largely been abandoned in place. Some portions of the OPWL system have been removed as a part of other RFETS construction projects. For instance, it is believed that some portions of the OPWL may have been removed during the years of construction of the Protected Area (PA). Pipelines beneath buildings were flushed with water until significant residues appeared to have been removed, then sealed at wall and floor penetrations with 6- to 12-inch plugs of "nonshrinking cement sealant" (DOE 1992b).

OPWL pipelines range from 1 to 10 inches in diameter and are constructed of a variety of materials including black iron, cast iron, plastic, polyethylene, vitrified clay, cement/asbestos, saran-lined steel, stainless steel, fiberglass, PVC, pyrex glass, and teflon.

OPWL pipelines are often connected within valve vaults. Valve vaults are sealed concrete containments provided to monitor for leaks and provide access for operation and maintenance of the OPWL system. In some instances, valve vaults were included in the initial installation of the OPWL system. In other instances, they were added to the process waste system later because persistent leaks were occurring repeatedly in the same locations (typically at elbows, valves, transitions from one pipe material to another, and other connectors).

A summary of the pipeline structural features including associated valve vaults, pumps, and manholes or lampholes are presented in Section 3.0.

2.2 SITE WALKS

Site walks were conducted for eight days between January and March 1994. The site walks were conducted to identify the following:

- OPWL component locations and interconnections;
- locations of structural features (e.g., valves, cleanouts, manholes);
- locations of pipeline penetrations into buildings;

- areas where constructions activities may have disturbed OPWL components; and

- logistical problems associated with field sampling activities (e.g., security requirements, heavy equipment access restrictions).

A nonintrusive inspection of manholes, valve vaults, and lampholes to visually inspect the pipeline was included in the site walks. Results of this investigation are inconclusive because of limited visibility. However, some useful information such as approximate depth to pipeline, number of pipelines, pipeline construction, and approximate size of pipeline was gleaned from this investigation. The results of the manhole investigation are presented in Appendix B.

Information was also acquired from building personnel during site walks. Data from the manhole investigation and information from RFETS personnel have been incorporated into the line-by-line summaries of the pipeline designations in Section 3.0.

The information presented in Section 3.0 is based on the best available information collected to date on the OPWL pipeline. However, many of the original OPWL engineering drawings no longer exist, and those that do exist often contain conflicting information.

Information provided by the site walks will be used to guide the field work and will be updated as the field investigations proceed and the actual pipeline structural features are determined and documented.

2.3 SURFACE RADIATION SURVEYS

As part of the effort to integrate the six OUs in the IA, a series of surface radiation surveys have been conducted throughout the IA (including OU9). As described in the *OU9 RFI/RI Work Plan*, the results of these surface radiation surveys were to be used to help locate additional test pits proposed as part of the Stage I field activities planned for the OPWLs (Section 4.0).

The first radiation survey, referred to as the high purity germanium (HPGe) survey, consists of a semiconductor radiation detector that measures in situ low-energy x-ray and gamma-ray emitting radionuclides in soil. The second surface radiation survey consists of a sodium iodide (NaI) survey that incorporates an NaI scintillation detector to measure low-energy gamma and x-rays. The NaI scintillation detector is also referred to as a Field Instrument for the Detection of Low Energy Radiation (FIDLER). The NaI survey is to be conducted in areas where the HPGe survey indicates elevated radiological concentrations and is designed to further delineate the area of contamination.

The results of the HPGe surveys conducted through May 1994 have been tabulated in Appendix C. Section 4.2 presents a discussion of how these results will be incorporated into the field investigations proposed for OU9.

2.0 PRELIMINARY FIELD ACTIVITIES

Preliminary field activities for the Stage 1 investigation of the OPWL pipeline include data compilation, site walks, and surface radiation surveys. The preliminary field activities were fundamental in the development of the rationale and approach for the proposed field investigation effort. These activities are described in the following sections.

2.1 DATA COMPILATION

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  - Building 774 discharge level of activity was raised from 10 percent to 25 percent of the drinking water limit. This level was considered acceptable until the effluent of the lower pond showed an activity level approaching 10 percent of the drinking water limit.

- February 1954:
  - The activity level for laundry waste discharged to the sanitary sewer was reduced form 10,000 d/m/l to 8,500 d/m/l.

- June 1972:
  - A Survey of the Rocky Flats Division Waste Streams presented criteria for process waste streams for buildings that handled uranium:
  - If the activity level was greater than 35,000 d/m/l, the waste stream was sent to Building 74 second stage operations.
  - If the activity level was less than 35,000 d/m/l but nitrate was 45 parts per million (ppm) or chromium (as chromate) greater than 2.5 ppm, then the water was sent to Pond 107.
  - If the concentrations were below the criteria in either or both of the first two, then the waste stream was sent to the sanitary sewer.

- The report also presented criteria for process waste streams for buildings that handled plutonium:

  - If the activity level was greater than 3,500 d/m/l, the waste stream was sent to Building 74 second-stage operations.

  - If the activity level was less than 3,500 d/m/l but nitrate was greater than 45 ppm or chromium (as chromate) greater than 2.5 pm, then the water was sent to Pond 207.

  - If the concentrations were below the criteria in either or both of the first two, then the waste stream was sent to the sanitary sewer.

The OPWL was placed in service when RFETS began production in 1952 (DOE 1992b). Some of the original lines were double-contained lines that included lampholes that allowed for inspection to see if liquid was present in the outer line. Repairs and additions were made to the system through 1975 (DOE 1992b). Beginning in 1975, the OPWL system was replaced by a double-contained, fully inspectable process waste system. This new process waste system was completed in the summer of 1984 (DOE 1992b). Some tanks and pipelines from the OPWL were incorporated into the new process waste system and into the RFETS exhaust plenum fire deluge system (DOE 1992b). In some cases, flexible tube was pushed through the existing OPWL, leaving the original line as a secondary containment.

Some of the OPWL pipelines were removed during the late 1970s and early 1980s. This work was primarily performed as part of a program called "Replace Uninspectable Process Waste Systems." The OPWL pipelines not removed and not converted to the new process waste system have largely been abandoned in place. Some portions of the OPWL system have been removed as a part of other RFETS construction projects. For instance, it is believed that some portions of the OPWL may have been removed during the years of construction of the Protected Area (PA). Pipelines beneath buildings were flushed with water until significant residues appeared to have been removed, then sealed at wall and floor penetrations with 6- to 12-inch plugs of "nonshrinking cement sealant" (DOE 1992b).

OPWL pipelines range from 1 to 10 inches in diameter and are constructed of a variety of materials including black iron, cast iron, plastic, polyethylene, vitrified clay, cement/asbestos, saran-lined steel, stainless steel, fiberglass, PVC, pyrex glass, and teflon.

OPWL pipelines are often connected within valve vaults. Valve vaults are sealed concrete containments provided to monitor for leaks and provide access for operation and maintenance of the OPWL system. In some instances, valve vaults were included in the initial installation of the OPWL system. In other instances, they were added to the process waste system later because persistent leaks were occurring repeatedly in the same locations (typically at elbows, valves, transitions from one pipe material to another, and other connectors).

A summary of the pipeline structural features including associated valve vaults, pumps, and manholes or lampholes are presented in Section 3.0.

2.2 SITE WALKS

Site walks were conducted for eight days between January and March 1994. The site walks were conducted to identify the following:

- OPWL component locations and interconnections;
- locations of structural features (e.g., valves, cleanouts, manholes);
- locations of pipeline penetrations into buildings;

- areas where constructions activities may have disturbed OPWL components; and

- logistical problems associated with field sampling activities (e.g., security requirements, heavy equipment access restrictions).

A nonintrusive inspection of manholes, valve vaults, and lampholes to visually inspect the pipeline was included in the site walks. Results of this investigation are inconclusive because of limited visibility. However, some useful information such as approximate depth to pipeline, number of pipelines, pipeline construction, and approximate size of pipeline was gleaned from this investigation. The results of the manhole investigation are presented in Appendix B.

Information was also acquired from building personnel during site walks. Data from the manhole investigation and information from RFETS personnel have been incorporated into the line-by-line summaries of the pipeline designations in Section 3.0.

The information presented in Section 3.0 is based on the best available information collected to date on the OPWL pipeline. However, many of the original OPWL engineering drawings no longer exist, and those that do exist often contain conflicting information.

Information provided by the site walks will be used to guide the field work and will be updated as the field investigations proceed and the actual pipeline structural features are determined and documented.

2.3 SURFACE RADIATION SURVEYS

As part of the effort to integrate the six OUs in the IA, a series of surface radiation surveys have been conducted throughout the IA (including OU9). As described in the *OU9 RFI/RI Work Plan*, the results of these surface radiation surveys were to be used to help locate additional test pits proposed as part of the Stage I field activities planned for the OPWLs (Section 4.0).

The first radiation survey, referred to as the high purity germanium (HPGe) survey, consists of a semiconductor radiation detector that measures in situ low-energy x-ray and gamma-ray emitting radionuclides in soil. The second surface radiation survey consists of a sodium iodide (NaI) survey that incorporates an NaI scintillation detector to measure low-energy gamma and x-rays. The NaI scintillation detector is also referred to as a Field Instrument for the Detection of Low Energy Radiation (FIDLER). The NaI survey is to be conducted in areas where the HPGe survey indicates elevated radiological concentrations and is designed to further delineate the area of contamination.

The results of the HPGe surveys conducted through May 1994 have been tabulated in Appendix C. Section 4.2 presents a discussion of how these results will be incorporated into the field investigations proposed for OU9.

3.0 PIPELINE DESCRIPTIONS

A summary description for each pipeline designation is presented in the following sections. Additional information, including structural features, physical description, past usage and current status, release history, and RFETS reference drawings, is presented in Table 3-1 and Appendix D. An RFETS reference list for all utility and engineering drawings for the OU9 OPWL is presented in Appendix E. Individual pipeline locations and test areas are shown on one or more plates, numbered 1 through 15, in this Technical Memorandum No. 1, Volume II-B.

3.1 OPWL P-1

Location. Line P-1 exits the south side of the west annex of Building 123 and extends east along the south side of the building (Plate 11). P-1 terminates at the intersection of P-2 and P-3 south of the east annex of the building. A process waste pumping station in the west annex is shown on the Replace Process Waste Piping Plan (Drawing 27216-2, drawn January 1974, as built February 1975, rev. January 1987).

Status. P-1 was installed in 1968 (U.S. Department of Energy [DOE] 1986; Rockwell 1976) and abandoned (DOE 1986; DOE 1985) in June 1982 (DOE 1986). The Underground Drain Piping Plan (Drawing 38849-400 [as-built July 1989]) indicates that the portion of P-1 that runs east-west between the two manholes has been removed. According to the Utility Layout (Drawing 15501-40-M, drawn July 1983, approved June 1986) and the Underground Drain Piping Plan (Drawing 38849-400 [as-built July 1989]), the portion of P-1 exiting south of the west annex of Building 123 from N-36104, E-18545 to N-36061, E-18545 has been converted to the new process waste system.

Physical Description. P-1 consists of a 3-inch polyethylene pipe inside a 4-inch steel pipe (DOE 1986; Rockwell 1976; EG&G 1990; DOE 1988). Total length has been reported as 180 feet (DOE 1986) and 120 feet (Rockwell 1976), with outside lengths of 89 feet (DOE 1985) and approximately 120 feet (EG&G 1990). P-1 connects to P-2 (4-inch cast iron) at Building 123 (DOE 1988) and to P-3 (4-inch vitrified clay) south of Building 123 (EG&G 1990; DOE 1988).

Wastes Transferred. P-1 transferred the following waste from Building 123 (DOE 1988):

- Acids: Nitric acid (HNO_3), hydrofluoric acid (HF), sulfuric acid (H_2SO_4), hydrochloric acid (HCl), acetic acid ($C_2H_4O_2$), and perchloric acid ($HClO_4$);

- Bases: Ammonium hydroxide (NH_4OH) and sodium hydroxide (NaOH);

- Solvents: Acetone, alcohols, cyclohexane, toluene, xylenes, triisooctomine, and ether;

- Radioactive Materials: Various isotopes of plutonium (Pu), americium (Am), uranium (U), and curium (Cm);

- Metals: Beryllium (Be) (trace amounts); and

- Others: Ammonium thiocyanate, ethylene glycol, and possible trace amounts of PCBs.

Site Walk Information. Two manholes associated with P-1 were investigated in March 1994. The first manhole, located south of the west annex of Building 123, contains a north-south pipeline that appeared to be an active transfer line (Jacobs 1994). The pipeline was approximately 5 feet below ground surface. The second manhole, located south of the east annex of Building 123, is approximately 5 feet deep. One pipe enters the manhole from the west, one from the north, one from the south, and one from the east. All are cut off and filled with concrete (Jacobs 1994). This evidence would tend to confirm that the east-west portion of P-1 was in fact either removed as shown on drawing 38849-400 or at least abandoned.

Historical Releases. Conflicting reports have been issued regarding historical releases from P-1. The 1986 OPWL Closure Plan (DOE 1986) reported that no releases have occurred (DOE 1986). However, the entire pipeline was identified on a location map in the 1988 Closure Plan as an area of reported release (DOE 1988).

3.2 OPWL P-2

Location. P-2 exists primarily beneath Building 123, and follows the general layout of the building. The General Plan and Profile (Drawing 23723, drawn July 1952; as-built, May 1953) shows the P-2 exiting the south end of the east side (original structure) of Building 123 (Plate 11).

Status. The pipeline has undergone at least two modifications. The Utility Layout (Drawing 15501-40-M, drawn July 1983, approved June 1986) indicates that Building 123 and pipes P-2 and P-3 have been extended south, and that the approximate invert elevation at the P-1/P-2/P-3 intersection is 6,028.2 feet. This extension is verified by the Utility Layout (Drawing 20829-5, August 1968). P-2 was installed in approximately 1952 (DOE 1986) or 1953 (Rockwell 1976), and decontaminated, removed, and replaced with inspectable pipe in June 1982 (DOE 1986).

Physical Description. P-2 consists of a 4-inch cast iron (DOE 1986; Rockwell 1976) pipe (Drawing 1-11590-23, issued February 1952; as-built, November 1953), with a total length of 452 feet (DOE 1986). Approximately 447 feet of P-2 exists beneath Building 123. P-2 connects to P-1 (3-inch polyethylene in 4-inch steel pipe) and P-3 (4-inch vitrified-clay pipe) at the southeast corner of the east annex of Building 123.

Wastes Transferred. P-2 transferred the following waste from Building 123 (DOE 1988):

- Acids: HNO_3, HF, H_2SO_4, HCl, $C_2H_4O_2$, and $HClO_4$;
- Bases: NH_4OH and NaOH;
- Solvents: Acetone, alcohols, cyclohexane, toluene, xylenes, triisooctomine, and ether;
- Radioactive Materials: Various isotopes of Pu, Am, U, and Cm;

- Metals: Be (trace amounts); and
- Others: Ammonium thiocyanate, ethylene glycol, and possible trace amounts of PCBs.

Site Walk Information. One manhole that is associated with P-2 was investigated in March 1994. The manhole, located south of the east annex of Building 123, was approximately 5 feet deep. One pipe entered the manhole from the west, one from the north, one from the south, and one from the east. All of the pipes were at the same level and were cut off and filled with concrete (Jacobs 1994).

Historical Releases. Reports indicate releases from P-2 beneath Building 123 (DOE 1986), and the entire pipeline has been identified on the location map as an area of reported release (DOE 1988). Regarding the P-2/P-3 connection, Basller et al. (1970) reported that the 4-inch cast iron process waste line from Building 123 to the Saran-lined pipe connection is about 19 years old and leaks are suspected.

3.3 OPWL P-3

Location. P-3 is located west of Building 441 (EG&G 1990; DOE 1988). P-3 originates at the P-1/P-2 intersection in the manhole located south of the east annex of Building 123 and tracks east to an elbow located in a manhole southeast of the east annex of Building 123, turns north and tracks to an elbow located in a manhole east of Building 123, turns east and terminates at Building 441 (Plate 11). (The Site Utility Plan [Drawing 15501-40-M, drawn July 1983, approved June 1986 and revised June 1990] indicates that Building 123 has been extended further south and line P-3 was moved south approximately 20 feet from its original alignment.)

Status. P-3 was installed in 1952 (DOE 1986; Rockwell 1976) and was abandoned in 1982 (DOE 1986).

Physical Description. P-3 consists of a 4-inch vitrified-clay pipe (DOE 1986; Rockwell 1976; EG&G 1990; DOE 1988) pipe (Drawing 23723), with a total length of 162 feet (DOE 1986; Rockwell 1976). The outside length has been reported as 92 feet (DOE 1985) and 158 feet (EG&G 1990). P-3 connects to P-1 (3-inch polyethylene in 4-inch steel pipe) and P-2 (4-inch cast-iron pipe) at the manhole south of east annex of Building 123 and to T-2 at Building 441.

Wastes Transferred. P-3 transferred the following process waste from Building 123 (DOE 1988):

- Acids: HNO_3, HF, H_2SO_4, HCl, $C_2H_4O_2$, and $HClO_4$;
- Bases: NH_4OH and NaOH;
- Solvents: Acetone, alcohols, cyclohexane, toluene, xylenes, triisooctomine, and ether;
- Radioactive Materials: Various isotopes of Pu, Am, U, and Cm;

- <u>Metals:</u> Be (trace amounts); and
- <u>Others:</u> Ammonium thiocyanate, ethylene glycol, and possible trace amounts of PCBs.

<u>Site Walk Information</u>. Three manholes that are associated with P-3 were investigated in March 1994. The first manhole, located south of the east annex of Building 123, was approximately 5 feet deep. One pipe entered the manhole from the west, one from the north, one from the south, and one from the east. All of the pipes are at the same level and are cut off and filled with concrete (Jacobs 1994). The second manhole located southeast of the east annex of Building 123 was approximately 5 feet deep. One open channel pipe enters from the west and turns to the north and exits the manhole. The third manhole located east of Building 123 is approximately 5 feet deep. The manhole is brick lined with an open channel pipe, which appears to be a 4-inch clay pipe that runs north to south with a "T" to the east. The northern section of the pipe "T" has a gate to control the flow to the north. This may be an indication of an additional pipeline spur; however, no information is available to confirm its existence.

<u>Historical Releases</u>. Reports indicate no releases from P-3 (DOE 1986); however, the entire pipeline was identified on a location map as an area of reported release (DOE 1988).

3.4 OPWL P-4

Location. P-4 extends from Building 429, south of Building 441, eastward to the intersection of P-6 located in a manhole west of Building 883 (Plates 11, 12, 13, and 14). P-4 is a gravity-flow pipeline from tanks T-2 and T-3 to the P-6 intersection. P-5 also is connected to P-4, which provides gravity transfer of process waste from Building 444. The General Plan and Profile (Drawing 23723, July 1952; as-built May 1953) indicates that the average depth of burial of P-4 is 3.5 feet.

Status. P-4 was installed in 1952 (DOE 1986; Rockwell 1976) and was abandoned (DOE 1986; DOE 1985) in April 1981 (DOE 1986).

Physical Description. P-4 consisted of 4-inch cast iron pipe (DOE 1986; Rockwell 1976; EG&G 1990; DOE 1988). The total length has been reported as 1,750 feet (DOE 1986; DOE 1985), and 1,773 feet (EG&G 1990). P-4 connects to P-5 (4-inch cast iron pipe) at manhole located north of Building 444 (EG&G 1990; DOE 1988), to P-6 (3-inch Saran-lined steel pipe inside a 10-inch vitrified-clay pipe) at manhole located west of Building 883 (EG&G 1990; DOE 1988), and to T-2 and T-3 at Building 429 (DOE 1988).

Wastes Transferred. P-4 transferred the following waste from Buildings 123, 441, and 444 (Rockwell 1976):

- Acids: HNO_3, HF, H_2SO_4, HCl, $C_2H_4O_2$, $HClO_4$, phosphoric acid (H_3PO_4), H_2CrO_4 oxalic, and cyanic;
- Bases: NH_4OH, NaOH, potassium hydroxide (KOH), and calcium hydroxide (CaOH);

- Solvents: Acetone, alcohols, cyclohexane, toluene, xylenes, triisooctomine, ether, trichloroethane (TCA), trichloroethene (TCE), pentachloroethene (PCE), and freon;

- Radioactive Materials: Various isotopes of Pu, Am, U, and Cm;

- Metals: Be (trace amounts), silver (Ag), gold (Au), chromium (Cr), tantalum (Ta), nickel (Ni), cadmium (Cd), platinum (Pt), lead (Pb), titanium (Ti), zinc (Zn), copper (Cu), tin (Sn), tungsten (W), iron (Fe), and mercury (Hg); and

- Others: Ammonium thiocyanate, ethylene glycol, possible trace amounts of PCBs, fluoride, lubricating oil, cutting oil, and lathe coolant (oil and carbon tetrachloride [CCl_4]).

Site Walk Information. One valve vault and two manholes that are associated with P-4 were investigated in March 1994. The valve vault or T-2/T-3 located south of Building 441 consisted of three manways into the vault. Two of the three manways were padlocked. The middle manway was opened to view the middle vault. The vault is approximately 5 feet deep with approximately 2 to 3 feet of water in the bottom. Two pipes enter from the north and lead to a T that goes to the southern vault. The first manhole, located south of Building 452, was inaccessible because of soil/gravel/cobbles and a concrete parking barrier that covers the northern edge of the manhole. The manhole cover is larger than usual. The second manhole west of Building 883, P-4/P-6 intersection, is approximately 8 feet deep. The P-4 pipeline enters on the west side to connect with P-6 that runs north to south. The P-4 pipeline is approximately 4 feet from ground surface, and the P-6 pipeline is 5 to 6 feet from ground surface. All pipes are closed top with no secondary containment.

Historical Releases. Numerous reports of historical releases from P-4 have been documented. These events are summarized below:

- A release occurred at the intersection of P-4 and T-3, and P-6, and at "two other locations" (DOE 1986).

- A small leak was found near Building 663 from 1960 to 1962. A small portion of line was replaced, and no subsequent leaks have been reported (Rockwell 1976).

- Several sections of pipeline were identified on a location map as area of reported release (DOE 1988).

- A leak of 2.5 gallons per hour (gph) at 37 pounds per square inch gauge (psig) was detected in a 1971 pressure test (ILDS 1971).

- Leak indications were found at the following locations:

  - Thirty feet east of the driveway south of Building 441: two leaking joints were repaired.

  - South of the transformer bank between Buildings 441 and 443: the area was excavated and the leak repaired.

  - South of Building 443: the area was excavated and the leak repaired.

  - North of Building 661, in utility pole storage area: the area was not excavated.

As reported by Maness (1971a), the area that ILDS was to test for P-4 was the 4-inch cast-iron line from the waste tank near Building 441 eastward 1,800 feet to a valve pit at the intersection with P-6. The ILDS test included the line to Building 444, designated as P-5.

- Between Building 441 to the intersection with P-6, the 1,950-foot 4-inch cast-iron pipe was found to have a leak rate of approximately 2.5 gph as estimated by ILDS. Several leak locations along this area were identified. The entire length of the area was cast-iron pipe with bell and spigot joints. Most (if not all) of the leaks appeared to be in the joints (Beck 1971a). Repairs were made at locations, and a final pressure test on the line indicated a leak rate of 1.3 gph. Repairs to the referenced leaks appear to have reduced the leak rate by 50 percent (Beck 1971b). However, no further information regarding the remaining leakage was found. Further investigation found that the cast-iron line was in good physical condition. Some surface corrosion in the form of scale was present (Hornbacher and Lott 1972).

- A major leak behind Building 441 was identified and repaired. The check valve at Building 441 was removed, and a flange with a 3/4-inch valve was installed (Maness 1971b).

- A probable small leak was found south of Building 443 (Maness 1971c).

- A major leak was found along P-4, south of Building 221 and north of the road. This area was excavated and the pipe repaired.

- One leak was indicated in the contractor's material storage area near Building 662 (Maness 1971d). One leak was identified west of 8th Street in a pole storage area (82 feet east of No. 63 fence) (Maness 1971d).

- Approximately 31 feet east of the driveway behind Building 441, a leak was detected during ILDS nitrous oxide leak testing. Soil concentrations were greater than 1,000 parts per million (ppm) of nitrous oxide. The area was uncovered and repaired (Maness 1971c). No documentation regarding any excavation in the area was found.

- A small probable leak was detected approximately 94 feet east of the driveway behind Building 441 (Maness 1971c). No report of repair was found.

- A break in the line close to the driveway of Building 663 occurred around 1960 to 1962. The line chipped as trucks backed over the shallow cover. The leak was detected as water bubbled to the ground surface. A small portion of the line was replaced, and no subsequent leaks were reported (Rockwell 1976).

- A soil sample taken at a location of a known break in the line was found to have a concentration of 62 ppm of nitrate. Plutonium-239 was found to be near background level at the same location. Rockwell (1976) claims that the east-west line between Buildings 444 and 883 carried only small amounts of depleted uranium and nitrates.

3.5 OPWL P-5

Location. P-5 is located north of (EG&G 1990; DOE 1988) and beneath (DOE 1988) Building 444 (Plate 12). P-5 originates in Building 444 and exits the north side and tracks to the manhole located south of Building 442. The alignment shown in Dow Drawing 23723, drawn July 1952, as-built May 1953, indicates that the original P-5 had a different alignment than the line described in the work plan. The original line left Building 444 approximately 15.5 feet west of where the work plan shows the line leaving the building. At a point 5 feet north of the building, the line becomes diagonal toward the northeast and then turns north again terminating at P-4. The work plan and the utility drawing show the line turning east and traveling 5 feet and then north, terminating at P-4. No drawings were located to verify the configuration shown on the work plan and utility drawings. The current process waste line runs along most of the original Line P-5.

Status. Line P-5 was installed in 1952 (DOE 1986) and was abandoned (DOE 1986; DOE 1985) in April 1981 (DOE 1986). The line is also reported to have been decontaminated, removed, and replaced with inspectable pipe (DOE 1986). Drawings 25838-X05 through 25838-X10, 25838-DX1, and 25838-D01 through 25838-D05 indicate that a "portion of the pipeline was abandoned in place. Drawings indicate pipes could be removed or abandoned after August 1, 1978. Other drawings indicate to flush clean, seal, and abandon."

Physical Description. P-5 consists of a 4-inch cast-iron pipe (DOE 1986; EG&G 1990; DOE 1988) or 2-, 3-, 4-, and 6-inch pipe, with a total length of 1,561 feet (DOE 1986). The outside length has been given as 175 feet (DOE 1985) and 152 feet (EG&G 1990). Line P-5 connects to line P-4 (4-inch cast-iron pipe) at the manhole located south of Building 442 (EG&G 1990; DOE 1988).

Wastes Transferred. P-5 transferred the following process waste from Building 444:

- Acids: H_3PO_4, HNO_3, HCl, H_2SO_4, HF, H_2CrO_4, oxalic, and cyanic;
- Bases: NaOH, KOH, NH_4OH, and CaOH;
- Solvents: TCA, TCE, PCE, and freon;
- Radioactive Materials: U-238 only;
- Metals: Ag, Au, Cr, Ta, Ni, Cd, Pt, Pb, Ti, Zn, Cu, Sn, W, Fe, Hg, and Be (trace); and
- Others: Fluoride, lubricating oil, cutting oil, and lathe coolant (oil and CCl_4).

Site Walk Information. One manhole that is associated with P-5 was inaccessible for investigation in March 1994. The manhole is located south of Building 442. The manhole was covered with soil, cobbles, and a concrete barrier. The manhole cover is larger than usual.

Historical Releases. Reports indicate releases from P-5 along the entire pipeline outside of Building 444 (DOE 1988) and a leak of 2.5 gph at 37 psig was detected in a 1971 pressure test (ILDS 1971). Leak indications were found in the ditch north of the Building 444 exclusion fence (excavated and repaired), 8 feet inside the fence toward Building 444 (not repaired), and 6 feet north of Building 444 (not excavated).

In addition, a major leak was found in the north-south leg of pipe from Building 444 to the intersection with P-4 during field testing. The location of the leak was identified as the center of the ditch just outside the fence north of Building 444 (Beck 1971a). Three nitrous oxide leaks were located by test probing for nitrous oxide southward to Building 444. The leak at the ditch just outside the fence north of Building 444 was verified by excavation (Beck 1971c) and was found to be displacing a volume of 47.7 gallons (Maness 1991e). The leak was repaired by tamping the lead seal in the bell and spigot joint. Maness (1971f) noted that high nitrous oxide concentrations approximately 6 feet from Building 444 were either from seepage from the larger leak to the north or a small leak of different origin.

3.6 OPWL P-6

Location. Line P-6 runs from Building 881 to the valve vault west of Building 884 (EG&G 1990; DOE 1988) (Plates 14 and 15). P-6 originates on the west side of Building 881 and tracks west to an elbow located east of the guard shack, then turns north and tracks to the manhole located west of Building 884. The first segment of the original pipeline was pumped uphill as it exited Building 881. Drawings 4180, 4181, and 4182 show the P-6 alignment.

Status. The Industrial Waste Plan and Profile (Drawing 3549-207E, drawn May 1952; as-built drawn May 1953, revised May 1956) indicates that P-6 was installed in 1953. P-6 was abandoned in December 1980 (DOE 1986). The Replace Process Waste, Piping Removal plans (Drawing 25609-X08, June 1976; Drawing 25609-X09, June 1976) indicate that the portion of P-6 west of T-24 and T-32 tank vault would be abandoned after June 2, 1976 (Appendix D). P-6 is not part of the existing process waste line and was abandoned in place.

Physical Description. P-6 consisted of a 3-inch Saran-lined steel pipe inside a 10-inch vitrified-clay pipe that ran westward from Building 881 for 120 feet and then northward 585 feet to a valve pit (Maness 1971a). This information was also verified on the manhole investigation in April 1994. P-6 connected to P-4 (4-inch cast-iron pipe) at the manhole located west of Building 883, to P-9 (3-inch steel pipe) at the lamphole located west of Building 884, to P-10 (3-inch stainless-steel pipe) at the manhole located west of Building 884, to P-11 (3-inch ribbed hose inside a 10-inch vitrified-clay pipe) at the manhole west of Building 884, and to P-54 (3-inch stainless-steel pipe) at Building 881.

Wastes Transferred. P-6 transferred process waste from Buildings 123, 441, 444, 865, 881, and 889 (EG&G 1990; DOE 1988). This waste stream included the following:

- Acids: HNO_3, HF, H_2SO_4, HCl, $C_2H_4O_2$, $HClO_4$, H_3PO_4, H_2CrO_4, oxalic, and cyanic;

- Bases: NH_4OH, NaOH, KOH, and CaOH;

- Solvents: Acetone, alcohols, cyclohexane, toluene, xylenes, triisooctomine, ether, CCl_4, TCA, TCE, PCE, freon, and paint solvents (trade names PASO, PESO);

- Radioactive Materials: Various isotopes of Pu, Am, U, Cm, and possibly Np-237;

- Metals: Be (trace amounts), Ag, Au, Cr, Ta, Ni, Cd, Pt, Pb, Ti, Zn, Cu, Sn, W, Fe, Hg, Mo, and Mn; and

- Others: Ammonium thiocyanate, ethylene glycol, possible trace amounts of PCBs, fluoride, lubricating oil, hydraulic oil, cutting oil, and lathe coolant (oil and CCl_4).

Site Walk Information. Three manholes and three lampholes that are associated with P-6 were investigated in April 1994. The first manhole located at the P-6/P-4 intersection west of Building 883 is approximately 8 feet deep. The P-4 pipeline enters on the west side to connect with P-6 that runs north to south. The P-4 pipeline is approximately 4 feet from ground surface, and the P-6 pipeline is approximately 5 to 6 feet below ground surface. All pipes are closed top with no secondary containment. The second manhole located at the P-6/P-10 intersection southwest of Building 884 is approximately 8 feet deep. P-6 runs south to north in the manhole, and P-10 enters from the east. The pipelines are approximately 5 to 6 feet below ground surface. All pipes are closed top with no secondary containment. The P-6/P-10 connection is visible. The third manhole located at the P-6/P-9 intersection west of Building 884 is approximately 10 feet deep. P-6 runs south to north in the manhole, and P-9 enters from the southeast. The south to north pipeline is a open top vitrified-clay pipe with a steel pipe inside of it, and the pipeline from the southeast is stainless steel. The piping is approximately 8 to 10 feet below ground surface. The bottom of the manhole appears to be dry. The first lamphole located southwest of Building 883 is approximately 4 feet deep. An open top vitrified-clay pipe approximately 10 to 12 inches with a 4-inch steel pipe inside was visible. The bottom of the lamphole appears to be dry. The second lamphole located midway west of Building 883 is approximately 4 to 5 feet deep. An open top vitrified-clay pipe approximately 10 to 12 inches with a 4-inch steel pipe inside was visible. The bottom of the lamphole appears to be dry. The third lamphole west of Building 884 is approximately 10 feet deep. An open top vitrified-clay pipe approximately 10 to 12 inches with a 4-inch steel pipe inside was visible. The bottom of the lamphole appears to be dry.

Historical Releases. Reports indicate releases from P-6 at the intersection with P-4, P-9, P-10, P-11, and near Building 881 (DOE 1986). In addition, the south end of P-6, the P-6/P-4 intersection west of Building 883, and the P-6/P-9/P-11 intersection west of Building 884, have been identified on a location map as an area of reported release (DOE 1988).

3.7 OPWL P-7

Location. P-7 is located south of (EG&G 1990; DOE 1988) and beneath (DOE 1988) Building 881 to Building 887 (Plate 15). P-7 originates on the south side of Building 881 and tracks south to an elbow, turns west, and terminates at Building 887.

Status. P-7 was installed in 1952 (DOE 1986). In 1976, P-7 was converted to a double-contained pipeline (Drawing 25609-013-M). The primary containment was removed and replaced in 1992 (Drawing 25609-013-01C). P-7 is currently part of the new PWTS.

Physical Description. The original P-7 pipeline consisted of 4-inch stainless-steel pipe (DOE 1986; EG&G 1990; DOE 1988) (Drawing 25609-X08). In 1976, 3.5-inch flex polyvinyl chloride (PVC) tubing was inserted into the 4-inch stainless-steel pipe and used as the primary containment (Drawing 25609-013-M). In 1992, the 3.5-inch flex PVC tubing was removed and replaced with 2-inch cross-linked polyethylene hose. The southern end, the east to west piping from the elbow to Building 887, was removed and replaced with 6-inch stainless-steel pipe (Drawing 25609-013-01C). The total length has been reported to be 440 feet (DOE 1986) with an outside length of approximately 85 feet (EG&G 1990). The assumed average depth for this line is 10 feet (Wright Water Engineers, Inc. 1994). Line P-7 connects to tanks T-24 and T-32 at Building 887 (DOE 1988).

Wastes Transferred. P-7 received waste from Building 881 (EG&G 1990; DOE 1988). This waste stream included the following:

- Acids: HNO_3, HF, H_2SO_4, and H_3PO_4;
- Bases: NaOH and KOH;
- Solvents: CCl_4, TCA, TCE, and freon;

- Radioactive Materials: Pu, Am (no tritium), U, and possibly Np-237;
- Metals: Cr, Ni, Fe, Hg, Mo, and Mn; and
- Others: Possible trace amounts of PCBs, lubricating oil, and grinding oil.

Historical Releases. The 1986 Closure Plan reported no known releases (DOE 1986). However, the entire pipeline has been identified on a location map as an area of reported release (DOE 1988).

3.8 OPWL P-8

The existence of P-8 is highly questionable. P-8 was identified as a pipeline from Building 881 south to Building 887. A review of the engineering drawings for this area and interviews with building personnel (EG&G 1994a) indicate that this line does not exist. No further investigation will be performed on this pipeline.

3.9 OPWL P-9

Location. Line P-9 is located west of (EG&G 1990; DOE 1988) and beneath (DOE 1988) Building 883 and runs to the valve vault west of Building 884 (EG&G 1990; DOE 1988) (Plate 14). P-9 originates in Building 883 and exits the west side tracking west to an elbow, then turns north and tracks to the valve vault located west of Building 884. Two drawings (Dow Drawings 4181 and 4182, both dated March 1959) indicate a slightly different layout for Line P-9 than shown on Drawing E-5 of the work plan. The Dow drawings indicate a 90-degree bend in the line after it exits Building 883, whereas the work plan and utilities Drawing 15501-43-M, drawn July 1985 and approved June 1986, shows a northwest trending angle in the line before turning north to the valve vault. The presence of a vacuum breaker in the pipeline indicates that it is forced flow for at least part of the line.

Status. P-9 was installed in 1957 (DOE 1986; Rockwell 1976) and abandoned in 1984 (DOE 1986, DOE 1985).

Physical Description. P-9 consists of 3-inch-diameter steel pipe (DOE 1986; Rockwell 1976; EG&G 1990; DOE 1988) and 1.5-inch-diameter stainless-steel pipe (Appendix D). Total length has been reported as 504 feet (DOE 1986; Rockwell 1976) with a reported outside length of approximately 390 feet (DOE 1985) and 410 feet (EG&G 1990). P-9 connects to P-6 (3-inch steel pipe) at the manhole west of Building 884, to P-11 (3-inch ribbed hose inside a Saran-lined 10-inch vitrified-clay pipe) at the manhole west of Building 884 (EG&G 1990; DOE 1988), and to tanks T-25 and T-26 at Building 883 (DOE 1988).

Wastes Transferred. P-9 transferred the following process waste from Building 883 (EG&G 1990; DOE 1988):

- Acids: None identified;
- Bases: KOH;
- Solvents: TCA and possibly others;
- Radioactive Materials: U-235 and U-238 only;
- Metals: Possibly Be; and
- Others: Oakite (cleaning solution) may have been used in the past.

Site Walk Information. P-9 has one manhole associated with it at the intersection of P-6 and P-11 west of Building 884. This manhole was investigated in March 1994 (Jacobs 1994). The investigation revealed an open top vitrified-clay pipe with an inner Saran-lined steel pipe approximately 8 to 10 feet below ground surface.

Historical Releases. Releases from P-9 are known to have occurred at the intersection of Line P-9 and P-6 (DOE 1986; DOE 1988).

3.10 OPWL P-10

Location. P-10 is located north and west of Building 889 (EG&G 1990; DOE 1988) and beneath Building 889 (DOE 1988) (Plate 14). P-10 originates on the west side of Building 865, tracks west to an elbow turning north, tracks north to another elbow turning west, and then tracks west until it intersects P-6. P-10 also has a pipeline spur that originates on the west side of Building 889 tracking to the west to a waste pit (T-40) and then to the north intersecting the east west P-10 alignment. Drawing 20829-19 (1968 utility drawing) indicates that P-10 is a pumped line with the high point located at approximately midline.

Status. P-10 was installed in 1968 (DOE 1986; Rockwell 1976) and abandoned in 1982 (DOE 1986). It has been reported that P-10 was abandoned in place (DOE 1985), and all pipe beneath Building 865 was capped and abandoned after August 21, 1981.

Physical Description. P-10 consists of 3-inch stainless-steel pipe (DOE 1986; Rockwell 1976; EG&G 1990; DOE 1988). The total length has been reported as 1,190 feet (DOE 1986), 550 feet (Rockwell 1976), and 560 feet (DOE 1985), with an outside length of approximately 455 feet (EG&G 1990). P-10 connects to P-6 (3-inch Saran-lined steel pipe inside a 10-inch vitrified-clay pipe) west of Building 884 (EG&G 1990; DOE 1988), to tank T-23 at Building 865 (DOE 1988), to tank T-28 at Building 889 (DOE 1988), and to tank T-40 west of Building 889.

Wastes Transferred. P-10 transferred the following waste from Building 865 (T-23) and Building 889 (T-28) (EG&G 1990; DOE 1988):

- Acids: HNO_3, HCl, HF, H_2SO_4, and H_2CrO_4;
- Bases: NaOH and NH_4OH;

- Solvents: Alcohols, acetone, TCE, paint solvents (trade names PASO, PESO), and possibly others;

- Radioactive Materials: U-238 only;

- Metals: Be, Cr, Ni, Pb, Pt, Ti, Ta, Zn, Cu, Sn, W; and

- Others: Lubricating oil, hydraulic oil, detergents, soap, grease.

Site Walk Information. One manhole associated with P-10 was investigated in March 1994 (Jacobs 1994). The manhole is located in the middle of the road north of Building 889. One pipe enters from the east approximately 6 feet from the ground surface and exits the west side approximately 3 feet from the ground surface.

Historical Releases. Releases from P-10 have been reported at the intersection with P-6 (DOE 1986) and at the west end of the pipeline (DOE 1988).

3.11 OPWL P-11

Location. Line P-11 is a gravity flow line located west of Building 884. P-11 originates at the intersection of P-11 with P-6 and P-9 and tracks north to the intersection of P-12 and P-13 located in the middle of the parking lot west of Portal 1 (Plates 10 and 14).

Status. P-11 was installed in 1952 and abandoned (DOE 1986; DOE 1985) in place in March 1984 (DOE 1986).

Physical Description. According to Drawing 1-3549-207 (drawn May 1952, as-built May 1953, and revised May 1956), the original P-11 pipeline consisted of a 3-inch Saran-lined steel pipe inside a 10-inch vitrified-clay pipe. In 1975, the Saran-lined steel pipe was removed and replaced with a 3-inch-diameter ribbed hose. The total length of P-11 has been reported as 165 feet (DOE 1986; DOE 1985; Rockwell 1976) and 175 feet (EG&G 1990). Line P-11 connects to P-6 (3-inch Saran-lined steel pipe inside a 10-inch vitrified-clay pipe) and P-9 (3-inch steel pipe) at the manhole west of Building 884 (EG&G 1990; DOE 1988) and to Line P-13 (3-inch ribbed hose inside 4-inch fiberglass pipe) northwest of Building 884 (DOE 1986; Rockwell 1976).

Wastes Transferred. P-11 transferred the following process waste from Buildings 123, 441, 444, 865, 881, 883, and 889 (EG&G 1990; DOE 1988):

- Acids: HNO_3, HF, H_2SO_4, HCl, $C_2H_4O_2$, $HClO_4$, H_3PO_4, H_2CrO_4, oxalic, cyanic;
- Bases: NH_4OH, NaOH, KOH, CaOH;

- Solvents: Acetone, alcohols, cyclohexane, toluene, xylenes, triisooctomine, ether, CCl_4, TCA, TCE, PCE, freon, paint solvents (trade names PASO, PESO);

- Radioactive Materials: Various isotopes of Pu, Am, U, Cm, possibly Np-237;

- Metals: Be (trace amounts), Ag, Au, Cr, Ta, Ni, Cd, Pt, Pb, Ti, Zn, Cu, Sn, W, Fe, Hg, Mo, Mn; and

- Others: Ammonium thiocyanate, ethylene glycol, possible trace amounts of PCBs, fluoride, lubricating oil, hydraulic oil, cutting oil, lathe coolant (oil and CCl_4), Oakite (cleaning solution).

Site Walk Information. The manhole investigation conducted in March of 1994 indicated that P-11 was a 3-inch ribbed hose inside a 10-inch vitrified-clay pipe approximately 8 to 10 feet below ground surface (Jacobs 1994).

Historical Releases. Releases from P-11 have been reported at the intersection with P-6 (DOE 1986) and both ends of the pipeline (DOE 1988). A leak of 27 gph at 20 psig was detected during a 1971 pressure test (ILDS 1971). Although the line is inside of another protective pipe, the presence of nitrous oxide indicated a leak north of the manhole west of Building 883 during a leak test conducted in 1971 (ILDS 1971).

3.12 OPWL P-12

Location. Line P-12 is located west of Building 708. P-12 originates at the intersection of P-11, tracks north to a valve vault west of Building 707 where the line intersects with P-14 and P-15 (Plate 10). Drawing 1-3549-207E shows the original alignment of P-12.

Status. P-12 was installed in 1952 (DOE 1986; Rockwell 1976) and abandoned in 1975 (Rockwell 1976). Notes from an interview with Mr. Maury Mass (EG&G 1991), describe how acid and steam destroyed the vitrified-clay outer shell north of Central Avenue. P-12 was abandoned, and a parallel line P-13 was constructed (DOE 1986). The closure plan (DOE 1988), however, appears to indicate a discrepancy in this description of P-12 and P-13. Pipelines P-12 and P-13 have been mislabeled (i.e., P-12 was labeled P-13, and P-13 was labeled P-12).

Physical Description. Line P-12 consisted of a 3-inch Saran-lined steel pipe inside a 10-inch vitrified-clay pipe (DOE 1986; Rockwell 1976). Total length has been reported as 573 feet (DOE 1986; DOE 1985; Rockwell 1976). Line P-12 connects to Line P-11 (3-inch ribbed hose inside a 10-inch vitrified- clay pipe) located in a parking lot west of Portal 1, and to P-14 (3-inch Saran-lined steel inside 10-inch vitrified clay) at the valve vault west of Building 707 (DOE 1988).

Wastes Transferred. P-12 transferred the following process waste from Buildings 122, 123, 441, 444, 865, 881, 883, and 889 (DOE 1988):

- Acids: HNO_3, HF, H_2SO_4, HCl, $C_2H_4O_2$, $HClO_4$, H_3PO_4, H_2CrO_4, oxalic, cyanic;
- Bases: NH_4OH, NaOH, KOH, CaOH;

- Solvents: Acetone, alcohols, cyclohexane, toluene, xylenes, triisooctomine, ether, CCl_4, TCA, TCE, PCE, freon, paint solvents (trade names PASO, PESO);

- Radioactive Materials: Various isotopes of Pu, Am, U, Cm, possibly Np-237;

- Metals: Be (trace amounts), Ag, Au, Cr, Ta, Ni, Cd, Pt, Pb, Ti, Zn, Cu, Sn, W, Fe, Hg, Mo, Mn; and

- Others: Ammonium thiocyanate, ethylene glycol, possible trace amounts of PCBs, fluoride, lubricating oil, hydraulic oil, cutting oil, lathe coolant (oil and CCl_4), Oakite (cleaning solution).

Site Walk Information. One valve vault and one lamphole located west of Building 707 are associated with P-12 and were investigated in April 1994 (Jacobs 1994). The valve vault did not contain any pipelines. The vault did contain various debris in the bottom. The depth of the vault is approximately 12 feet, with approximately 2 feet of water. The lamphole located approximately 60 feet south of the valve vault was filled with water, and no investigation was possible.

Historical Releases. Releases from P-12 have been reported at the intersection of P-12 with P-11 (DOE 1986) and along the entire pipeline (DOE 1988). During routine inspection of the process waste system, a leak was found between Central Avenue and the pipeline expansion pit inside the Building 707 fenced area. The leakage was contained inside the pit, with no evidence of contamination to the environment. The pipeline was temporarily repaired by sealing the end of the secondary containment pipe and allowing it to act as the primary carrier. Repair of the primary line was scheduled for March 1975. This line is targeted by PAC 700-147.1 (Wright Water Engineers 1994).

The section of line running from the intersection of P-6/P-9/P-11 north to the intersection of P-15/P-16, located east of the guard shack for Buildings 559 and 776, had two sections with serious leaks (Beck 1971d). A leak rate of 27 gph at 20 psig was noted (Beck 1971d). One of these locations was identified as south of the valve vault near the corner of Sage and 8th (at the intersection of P-12 and P-14), and the other was north of the intersection of P-6/P-9/P-11. Areas were not excavated; therefore, the exact areas of leaks are not known (Maness 1971g). The leaking portions were Saran-lined pipe installed inside of clay pipe which prevented pinpointing the leaks without excavation. At the time, there were no plans for excavation because the work was outside the scope of the project.

3.13 OPWL P-13

Location. Line P-13 is located west of Building 708 paralleling P-12. P-13 originates at the intersection of P-11, tracks north to a valve vault west of Building 707 where the line intersects with P-15 (Plate 10).

Status. Line P-13 was installed as a replacement bypass line for P-12 that was destroyed by acid and steam (DOE 1986). Line P-13 was installed in 1975 (DOE 1986; Rockwell 1976) and abandoned in 1984 (DOE 1986). It has been reported that P-13 was abandoned in place (DOE 1986; DOE 1985). The closure plan (DOE 1988), however, appears to indicate a discrepancy in this description of P-12 and P-13. Pipelines P-12 and P-13 have been mislabeled (i.e., P-12 was labeled P-13, and P-13 was labeled P-12).

Physical Description. P-13 consists of a 3-inch-diameter ribbed hose inside a 4-inch fiberglass pipe (DOE 1986), a 3-inch-diameter ribbed hose inside a 4-inch fiberglass reinforced epoxy pipe (Rockwell 1976), and a 3-inch-diameter fiberglass pipe inside 4-inch fiberglass pipe (EG&G 1990; DOE 1988). The total length has been reported as 523 feet (DOE 1986; DOE 1985; Rockwell 1976). Line P-13 connects to P-11 (3-inch ribbed hose inside a 10-inch vitrified-clay pipe) in the parking lot west of Portal 1 (EG&G 1990; DOE 1988) and to P-15 (3-inch stainless-steel pipe) at the valve vault west of Building 707 (EG&G 1990; DOE 1988). Discrepancies exist concerning whether P-13 connected to P-12, and the correct total length of P-13. No engineering drawings could be located to determine the lines characteristics. All information about P-13 was obtained through meetings with key personnel (Wright Water Engineers 1994).

Wastes Transferred. P-13 transferred the following process waste from Buildings 123, 441, 444, 865, 881, 883, and 889 (DOE 1988):

- Acids: HNO_3, HF, H_2SO_4, HCl, $C_2H_4O_2$, $HClO_4$, H_3PO_4, H_2CrO_4, oxalic, cyanic;

- Bases: NH_4OH, NaOH, KOH, CaOH;

- Solvents: Acetone, alcohols, cyclohexane, toluene, xylenes, triisooctomine, ether, CCl_4, TCA, TCE, PCE, freon, paint solvents (trade names PASO, PESO);

- Radioactive Materials: Various isotopes of Pu, Am, U, Cm, possibly Np-237;

- Metals: Be (trace amounts), Ag, Au, Cr, Ta, Ni, Cd, Pt, Pb, Ti, Zn, Cu, Sn, W, Fe, Hg, Mo, Mn; and

- Others: Ammonium thiocyanate, ethylene glycol, possible trace amounts of PCBs, fluoride, lubricating oil, hydraulic oil, cutting oil, lathe coolant (oil and CCl_4), Oakite (cleaning solution).

Site Walk Information. One valve vault located west of Building 707 that is associated with P-13 was investigated in April 1994 (Jacobs 1994). The valve vault did not contain any pipelines. The vault did contain various debris in the bottom. The depth of the vault is approximately 12 feet with approximately 2 feet of water.

Historical Releases. A release from P-13 occurred at valve vault No. 7 west of Building 707 on April 4, 1983 (Rockwell 1983). In addition, the entire pipeline has been identified on a location map as an area of reported release (DOE 1988).

3.14 OPWL P-14

Location. Line P-14 exits the valve vault west of Building 707, extends northeast to Building 778, and then north to the valve pit located southwest of Building 703 (Plates 6 and 10). P-14 is designated as a gravity-flow pipeline. Dow Drawing 3549-207E (drawn May 1952, as-built May 1953, and revised May 1956), is a plan-profile drawing of the OPWL from Building 881 to 774. The segment of this line designated by P-14 is not consistent with the location provided on work plan Drawing C-5 or the utility drawings. The northeast end of the diagonal portion is approximately 28 feet farther south on the as-built drawing, than it appears on Drawing C-5 of the work plan.

The original P-14 pipeline continued north under the current location of Building 777. North of Building 777, its location becomes consistent with P-20 and P-21 until it finally reaches Building 774. A large portion of P-14 lies under Buildings 707, 778, and 777. All buildings were built after the installation of P-14. It is reported that portions of the pipeline may have been removed for construction of Buildings 707 and 777 (Rockwell 1976).

Status. P-14 was installed in 1952 (DOE 1986; Rockwell 1976) and abandoned in 1968 (DOE 1986; Rockwell 1976). It is reported that P-14 was decontaminated, removed, and replaced with inspectable pipe (DOE 1986) or abandoned in place (DOE 1985; EG&G 1990; DOE 1988).

Physical Description. P-14 pipeline consists of a 3-inch Saran-lined steel pipe inside a 10-inch vitrified-clay (DOE 1986; Rockwell 1976; Drawing 3549-207E). The total length has been reported as 625 feet (DOE 1986; DOE 1985) and 942 feet (Rockwell 1976), with an outside length of 648 feet (EG&G 1990). P-14 connected to P-12 (3-inch Saran-lined steel pipe inside 10-inch vitrified-clay pipe) at the valve vault west of Building 707 (EG&G 1990; DOE 1988), P-21 (3-inch stainless-steel pipe), P-36 (3-inch stainless-steel pipe), and P-58 (3-inch black iron pipe [drawing #14267-9]) at the valve vault southwest of Building 703 (DOE 1986; Rockwell 1976; EG&G 1990; DOE 1988).

Wastes Transferred. P-14 transferred the following process waste from Buildings 123, 441, 444, 881, 883, 865, and 889 (Rockwell 1976; EG&G 1990; DOE 1988):

- Acids: HNO_3, HF, H_2SO_4, HCl, $C_2H_4O_2$, $HClO_4$, H_3PO_4, H_2CrO_4, oxalic, cyanic;

- Bases: NH_4OH, NaOH, KOH, CaOH;

- Solvents: Acetone, alcohols, cyclohexane, toluene, xylenes, triisooctomine, ether, CCl_4, TCA, TCE, PCE, freon, paint solvents (trade names PASO, PESO);

- Radioactive Materials: Various isotopes of Pu, Am, U, Cm, possibly Np-237;

- Metals: Be (trace amounts), Ag, Au, Cr, Ta, Ni, Cd, Pt, Pb, Ti, Zn, Cu, Sn, W, Fe, Hg, Mo, Mn; and

- Others: Ammonium thiocyanate, ethylene glycol, possible trace amounts of PCBs, fluoride, lubricating oil, hydraulic oil, cutting oil, lathe coolant (oil and CCl_4), Oakite (cleaning solution).

Site Walk Information. Two valve vaults that are associated with P-14 were investigated in April 1994 (Jacobs 1994). The valve vault located west of Building 707 did not contain any pipelines. The first vault did contain various debris in the bottom. The depth of the vault is approximately 12 feet with approximately 2 feet of water. The second valve vault located southwest of Building 703 contained a 10-inch vitrified-clay pipe that exited the north and the south sides. All pipe in the vault was cut at the wall and removed. The depth of the vault is approximately 10 feet with approximately 6 feet of water.

Historical Releases. The following list provides information regarding historical releases from P-14:

- No data were found in the RCRA Post-Closure Care Permit Application (DOE 1986).
- Acid leaks were discovered at the intersection of P-14 and P-12 (Rockwell 1976).
- Some soil has been infiltrated in the immediate vicinity of the original location (DOW Chemical Company 1973).
- Entire pipelines were identified on location maps as an area of reported release (DOE 1988).
- Substantial leaks occurred at the elbow connections during its use as a result of expansion from steam condensate from Building 881.

A break in the Building 881 to Building 774 process waste line occurred during the relocation of the line for construction of Building 777 in 1962. Excavation was completed in parking lot 776 (Building 707), and the spilled wastewater was pumped to a ditch around the parking lot (Kittinger 1964). This section of line could be part of P-14 or P-15. In December of 1958, a bad leak occurred when the south 45-degree elbow of P-14 broke and process waste followed the containment pipe to the north 45-degree elbow and leaked into a ditch.

The waste transferred from Building 881 to Building 774 was 2,700 gallons of laboratory and laundry waste that included a radioactivity of 0.51 ppm enriched uranium and nitrate of 120 ppm. Only 1,350 gallons were received in Building 774, indicating that 1,350 gallons leaked (Rockwell 1976). The soil sample indicates plutonium contamination although no information was found concerning a plutonium waste leak. Soil sample No. 5, documented in *Survey of the Status of Existing Process Waste Lines* (Rockwell 1976), was taken from just south of Building 777. The report indicates that the contamination levels associated with P-14 leaks in this area are plutonium at 0.485 disintegrations per minute per gram (d/m/g) (Rockwell 1976).

3.15 OPWL P-15

Location. Line P-15 exits the valve vault west of Building 707, extends north to a manhole northwest of Building 707, and then extends east to a manhole northeast of Building 707 (Plates 6 and 10). The addition of line P-15 seems to be associated with the construction of Building 707. When Building 707 was constructed, P-14, which was part of the original process waste line running between Buildings 881 and 774, (DOE 1986; Rockwell 1976) was abandoned and an alternate route (P-15) had to be constructed.

Status. P-15 was installed in 1968 (DOE 1986; Rockwell 1976) and abandoned in 1984 (DOE 1986). It is reported that P-15 was abandoned in place (DOE 1986; Rockwell 1976).

Physical Description. P-15 consists of a 3-inch stainless-steel (DOE 1986; Rockwell 1976), or a 3-inch stainless-steel pipe inside 10-inch vitrified-clay pipe (EG&G 1990; DOE 1988). The utility drawing indicates that P-15 is a 3-inch Saran-lined pipe inside a 10-inch vitrified-clay pipe. The manhole investigation in April 1994 indicated that the piping is stainless steel (EG&G 1990). The total length has been reported both as 878 feet (DOE 1986; Rockwell 1976) and 850 feet (DOE 1985), with an outside length of 785 feet (EG&G 1990). P-15 connects to P-13 (3-inch ribbed hose inside a 4-inch fiberglass pipe), P-16 (3-inch PVC) (EG&G 1990; DOE 1988), P-19 (3-inch stainless-steel pipe) (EG&G 1990; DOE 1988), and P-20 (3-inch stainless-steel pipe) (EG&G 1990; DOE 1988).

Wastes Transferred. P-15 received wastes from Buildings 123, 441, 444, 559, 881, 883, 865, and 889 (Rockwell 1976; DOE 1990; DOE 1988). This waste stream included the following:

- Acids: HNO_3, HF, H_2SO_4, HCl, $C_2H_4O_2$, $HClO_4$, H_3PO_4, H_2CrO_4, oxalic, cyanic;

- Bases: NH_4OH, NaOH, KOH, NH_4OH, CaOH;

- Solvents: Acetone, alcohols, cyclohexane, toluene, xylenes, triisooctomine, ether, TCA, TCE, PCE, freon, CCl_4, chloroform, paint solvents (trade names PASO, PESO);

- Radioactive Materials: Various isotopes of Pu, Am, U, Cm, possibly Np-237;

- Metals: Ag, Au, Cr, Ta, Ni, Cd, Pt, Pb, Ti, Zn, Cu, Sn, W, Fe, Hg, molybdenum (Mo), magnesium (Mn), Be (trace amounts); and

- Others: Ammonium thiocyanate, ethylene glycol, possible PCBs, fluoride, lubricating oil, cutting oil, lathe coolant (oil and CCl_4), hydraulic oil, Oakite (cleaning solution).

Site Walk Information. Two valve vaults and two manholes that are associated with P-15 were investigated in April 1994 (Jacobs 1994). The piping in the valve vault located west of Building 707 was cut off at the wall and removed. Various debris was observed in the vault. The depth of the vault is approximately 12 feet with approximately 2 feet of water. The manhole located northwest of Building 707 was filled with water so no investigation was possible. The manhole located northeast of Building 707 was filled with water and also could not be investigated.

Historical Releases. Reports indicate no releases from P-15 (DOE 1986); however, a leak of 27 gph at 20 psig was detected in a 1971 pressure test (ILDS 1971).

3.16 OPWL P-16

Location. P-16 tracks from Building 528 east to the manhole located east of the guard shack (Plates 5 and 6). P-16 originates at T-7 inside Building 528 and runs east to the P-16/P-15 intersection.

Status. P-16 was installed in 1968 (DOE 1986; Rockwell 1976), and abandoned in 1982 (DOE 1986). It has been reported that P-16 was abandoned in place (DOE 1986; DOE 1985).

Physical Description. P-16 consists of 3-inch PVC pipe (Appendix D; DOE 1986; Rockwell 1976; EG&G 1990; DOE 1988). The total length is reported as 170 feet (DOE 1986; Rockwell 1976), 165 feet (DOE 1985), and 130 feet (Appendix D), with an outside length of approximately 110 feet (EG&G 1990). P-16 connects to T-7 at Building 528 (DOE 1988), and to Line P-15 (3-inch stainless-steel pipe) at the valve vault east of Building 528 (EG&G 1990; DOE 1988).

Wastes Transferred. P-16 received waste from Building 559 (Appendix D; EG&G 1990; DOE 1988). This waste included the following:

- Acids: HNO_3, HCl, H_2SO_4, HF, H_2CrO_4;
- Bases: NH_4OH, NaOH, KOH;
- Solvents: Acetone, CCl_4, chloroform, 1,1,1 TCA, TCE, freon;
- Radioactive Materials: Primarily Pu, with lesser amounts of Am, U;
- Metals: Numerous metals used in preparation of standards. Primarily Cu and Cr; and
- Others: Very slight chance of PCBs, pesticides, or herbicides.

Site Walk Information. One manhole associated with P-16 was investigated in April 1994 (Jacobs 1994). The manhole located west of Building 707 at the P-15/P-16 intersection contained two 4-inch stainless-steel pipes. One pipe enters the vault from the west and connects to the other pipe tracking south to north. Depth of the pipes from the ground surface is approximately 10 feet. The depth of the vault is approximately 15 feet with approximately 2 inches of water at the bottom.

Historical Releases. Reports indicate a release from P-16 at the intersection of P-16 and holding tank T-7 (DOE 1986).

3.17 OPWL P-17

Location. Line P-17 is located east of (EG&G 1990; DOE 1988) and beneath (DOE 1988) Building 559 (Plate 5). P-17 originates inside Building 559 and exits at two locations. One pipeline exits the east side of Building 559 and tracks to an elbow, turns south, tracks to a manhole located north of Building 528, and then continues to Building 528 waste tank T-7. The other pipeline exits Building 559 on the southeast corner and tracks east to the manhole located north of Building 528. Both pipelines exiting Building 559 intersect at the manhole located north of Building 528.

Status. P-17 was installed in 1968 (DOE 1986; Rockwell 1976), and abandoned in 1982 (DOE 1986). It has been reported that all piping above the floor slab was removed (Appendix D) and the rest abandoned in place (DOE 1986; Appendix D).

Physical Description. P-17 consisted of 4-inch glass pipe (DOE 1986; Rockwell 1976), 3-inch glass and 4-inch PVC pipe inside 6-inch glass and 4-inch stainless steel (Appendix D), and 4-inch PVC and polyethylene pipe (EG&G 1990; DOE 1988). The original P-17 pipeline consisted of Pyrex® glass beneath and adjacent to Building 559. A break was discovered in the line from Building 559 to Building 528. In May 1972, the southern section of P-17 beneath Building 559 was discovered to be leaking. A PVC bypass of the Pyrex® line beneath the south half of Building 559 was installed. The total length has been listed as 1,130 feet (DOE 1986), with an outside length of 135 feet (Rockwell 1976) and 160 feet (EG&G 1990). P-17 connects to T-7 at Building 528 (DOE 1988).

Wastes Transferred. P-17 transferred laboratory waste from Building 559 to Building 528. The waste stream included the following:

- Acids: HNO_3, HCl, H_2SO_4, HF, H_2CrO_4;
- Bases: NH_4OH, NaOH, KOH;
- Solvents: Acetone, CCl_4, chloroform, 1,1,1 TCA, TCE, freon;
- Radioactive Materials: Primarily Pu, with lesser amounts of Am, U;
- Metals: Numerous metals used in preparation of standards. Primarily Cu and Cr; and
- Others: Very slight chance of PCBs, pesticides, or herbicides.

Site Walk Information. One manhole associated with P-17 was investigated in April 1994 (Jacobs 1994). The manhole is located southeast of Building 559 and is approximately 10 feet deep. Two pipes enter the manhole, one from the north side and one from the west. Both pipes intersect and exit on the south side. The pipes are 4-inch PVC. Depth of the pipes from the ground surface is approximately 7 feet. There is approximately 1 foot of water in the bottom of the manhole.

Historical Releases. Reports (Werkema 1977) indicate that a release from P-17 resulting from a break was discovered in the line from Building 559 to Building 528 in 1969. The rupture of P-17 caused soil contamination with activity of 4,500 pCi/g. In May 1972, the southern section of P-17 beneath Building 559 was discovered to be leaking. A PVC bypass of the Pyrex® line beneath the south half of Building 559 was installed. In May 1977, influx of contaminated groundwater was discovered in the manhole adjacent to the southwest corner of Building 559. The contamination was believed to be residue from the 1972 occurrence. Also in May 1977, 4,600 gallons of contaminated water leaked into a process waste tank in Building 528. The leak was the result of a broken 3-inch PVC process water supply line from Building 559. It was concluded that the process water supply line, the process line, and the shell of the waste line were probably broken.

In 1968 and 1972, contaminated soil from around the pipeline was removed and shipped offsite. The infiltrated soil removed for offsite disposal had a surface area of several hundred square feet. In 1972, 82 drums of contaminated soil were removed.

3.18 OPWL P-18

P-18 appears to be an invalid pipeline designation. No information has been located to verify that this line or any process waste line exists on the west side of Building 559. Interviewed personnel have stated that no process waste lines are located on the west side of Building 559 (Dikeman 1994).

3.19 OPWL P-19

Location. Line P-19 carries process waste from Building 707 to holding tanks T-11 and T-30, located in Building 731 east of Building 707. Line P-19 continues north from Building 731 to a manhole located northeast of Building 707 (Plate 6).

Status. P-19 was installed in 1968 (DOE 1986; Rockwell 1976) and abandoned in 1984 (DOE 1986). It is reported that the portion of P-19 located inside Building 707 and north of 731 was abandoned in place (DOE 1986; DOE 1985), and that the portion of the line between Buildings 707 and 731 was removed (Appendix D).

Physical Description. P-19 consists of a 3-inch stainless-steel pipe (DOE 1986; Rockwell 1976; EG&G 1990; DOE 1988). Total length has been reported as 603 feet (DOE 1986), 980 feet (Appendix D), and 186 feet (Rockwell 1976), with an outside length reported to be 154 feet (DOE 1985), and 147 feet (EG&G 1990). P-19 connects to P-15 (3-inch stainless-steel pipe) at the valve vault northeast of Building 707 (EG&G 1990; DOE 1988), to P-20 (3-inch stainless-steel pipe) at the valve vault northeast of Building 707 (EG&G 1990; DOE 1988), and to T-11 and T-30 in Building 731 (DOE 1988).

Wastes Transferred. P-19 received waste from Building 707 only. This waste stream included the following:

- Acids: None identified;
- Bases: None identified;
- Solvents: CCl_4, TCA, technetium (TC), chloroethane, freon;

- Radioactive Materials: Pu, Am, U;

- Metals: Pb, Be, Ta, calcium (Ca), lithium (Li); and

- Others: Fluoride (from calcium fluoride [CaF_2]), chloride (from lithium chlorine [LiCl]), machine oils, lubricating oil, lathe coolant (oil and CCl_4), ethylene glycol.

Site Walk Information. An attempt to investigate a manhole associated with P-19 in April 1994 (Jacobs 1994) was unsuccessful because of water buildup within the manhole.

Historical Releases. No releases from P-19 have been reported (DOE 1986); however, Buildings 707 and 731, and the valve vault northeast of Building 707 have been identified on a location map as an area of reported release (DOE 1988).

3.20 OPWL P-20

Location. Line P-20 is a continuation of line P-19 and P-15 as it exits the manhole northeast of Building 707 (Plates 3 and 6). The pipeline tracks east of the manhole, turns north, and tracks to the northeast corner of Building 777. The line then turns west and tracks to the original alignment of the 1952 process waste line, turns north again, and tracks to the valve vault southwest of Building 703. The original process waste line from Building 881 to Building 774 as shown on Dow Drawing 3549-207E (originally drawn May 1952, as-built drawn May 1953, and revised May 1956), is aligned consistently with the northern portion of P-20 as it is shown on drawings B-5 and C-5 of the work plan. P-20 also has a pipeline spur associated with it (P-20.1). P-20.1 originates on the west side of Building 729 at location N-37408, E-21106 and tracks west to intersect the north-south section of P-20 east of Building 777 at location N-37408, E-21058. P-20.1 is not identified in the OU9 Work Plan.

Status. P-20 was installed in 1968 (Appendix D; DOE 1986) and abandoned in 1984 (DOE 1986). It is reported that P-20 was abandoned in place (DOE 1986; DOE 1985). It is reported that P-20.1 was installed when Buildings 779 and 729 were constructed and abandoned in place in 1977 (Drawing 25845-12S).

Physical Description. P-20 consists of a 3-inch stainless-steel pipe (Appendix D; DOE 1986; EG&G 1990; DOE 1988). The total length has been reported as 499 feet (DOE 1986), 480 feet (DOE 1985) and 455 feet (Appendix D), with an outside length of 475 feet (EG&G 1990). P-20.1 consists of a 1-inch black-iron or cast-iron pipe (Drawing 25845-12S). The total length has been reported as 45 feet (Drawing 25845-12S). P-20 connects to P-15 (3-inch stainless-steel pipe) P-19 (3-inch stainless-steel pipe), P-21 (3-inch stainless-steel pipe), P-36 (3-inch PVC and stainless-steel pipe), and P-58 (3-inch black iron pipe [drawing #14267-9]) at valve vault southwest of Building 703. P-20.1 connects to the north-south P-20 pipeline and Building 729.

Wastes Transferred. P-20 received waste from Buildings 123, 441, 444, 559, 707, 729, 865, 881, 883, 865, and 889 (Appendix D; EG&G 1990; DOE 1988). This waste stream included the following:

- Acids: HNO_3, HF, H_2SO_4, HCl, $C_2H_4O_2$, $HClO_4$, H_3PO_4, H_2CrO_4, oxalic, and cyanic;

- Bases: NH_4OH, NaOH, KOH, NH_4OH, and CaOH;

- Solvents: Acetone, alcohols, cyclohexane, toluene, xylenes, triisooctomine, ether, TCA, TCE, PCE, freon, CCl_4, chloroform, chloroethane, and paint solvents (trade names PASO, PESO);

- Radioactive Materials: Various isotopes of Pu, Am, U, Cm, and possibly Np-237;

- Metals: Ag, Au, Cr, Ta, Ni, Cd, Pt, Pb, Ti, Zn, Cu, Ca, Sn, W, Fe, Hg, Mo, Mn, Li, and Be (trace amounts); and

- Others: Ammonium thiocyanate, ethylene glycol, possible PCBs, fluoride, chloride, lubricating oil, cutting oil, lathe coolant (oil and CCl_4), hydraulic oil, and Oakite (cleaning solution).

Site Walk Information. One manhole and one valve vault associated with P-20 were investigated in April 1994. The manhole located northeast of Building 707 was not observable because it was filled with water. The valve vault located southwest of Building 703 contained a 10-inch vitrified-clay pipe that exited the north and the south sides. All piping in the vault was cut at the wall and removed. The depth of the vault is approximately 10 feet with approximately 6 feet of water.

Historical Releases. Releases from P-20 are reported to have occurred at the intersection of P-20 with P-21 (DOE 1986), and at the valve vault southwest of Building 703, which is identified on a location map as an area of reported release (DOE 1988). No reports of releases were identified from P-20.1.

3.21 OPWL P-21

Location. Line P-21 exits the north side of the valve vault southwest of Building 703 and tracks north to Building 774 (Plate 3). Drawing 15507-5 (drawn March 1976 and approved December 1976) indicates that the northern portion of line P-21 was added to the process waste system in 1972, probably to replace the original 1952 line directly south of Building 774, as shown in Dow Drawing 3549-207E, drawn May 1952, as-built May 1953, and revised May 1956.

Status. P-21 was installed in 1952 (DOE 1986; Rockwell 1976) and abandoned in 1984 (DOE 1986). It is reported that P-21 was abandoned in place (DOE 1986).

Physical Description. P-21 consists of a 3-inch stainless-steel pipe (DOE 1986; Rockwell 1976; EG&G 1990; DOE 1988). Total length has been reported as 386 feet (DOE 1986), 185 feet (DOE 1985), with an outside length of 310 feet (EG&G 1990). P-21 connects to P-14 (3-inch Saran-lined steel pipe inside a 10-inch vitrified-clay pipe), P-20 (3-inch stainless-steel pipe), P-36 (3-inch stainless-steel pipe), and P-58 (3-inch black iron pipe [drawing #14267-9]) at the valve vault southwest of Building 703 (EG&G 1990; DOE 1988).

Wastes Transferred. P-21 received waste from Buildings 122, 123, 441, 444, 559, 707, 729, 881, 883, 865, and 889 (EG&G 1990; DOE 1988). This waste stream included the following:

- Acids: HNO_3, HF, sulfuric acid (H_2SO_4), HCl, $C_2H_4O_2$, $HClO_4$, H_3PO_4, H_2CrO_4, oxalic, and cyanic;

- Bases: NH_4OH, NaOH, KOH, and CaOH;

- Solvents: Acetone, alcohols, cyclohexane, toluene, xylenes, triisooctomine, ether, TCA, TCE, PCE, freon, CCl_4, chloroform, chloroethane, and paint solvents (trade names PASO, PESO);

- Radioactive Materials: Various isotopes of Pu, Am, U, Cm, and possibly Np-237;

- Metals: Ag, Au, Cr, Ta, Ni, Cd, Pt, Pb, Ti, Zn, Cu, Ca, Sn, W, Fe, Hg, Mo, Mn, Li, and Be (trace amounts); and

- Others: Ammonium thiocyanate, ethylene glycol, possible PCBs, fluoride, chloride, lubricating oil, cutting oil, lathe coolant (oil and CCl_4), hydraulic oil, and Oakite (cleaning solution).

Site Walk Information. One valve vault was investigated in April 1994. The valve vault was located southwest of Building 703. It contained a 10-inch vitrified-clay pipe that exited the north and the south sides. All piping in the vault was cut at the wall and removed. The depth of the vault is approximately 10 feet with approximately 6 feet of water.

Historical Releases. Reports regarding historical releases from P-21 indicate a release at the intersection of P-21 with P-20. In addition, the valve vault southwest of Building 703 has been identified as an area of reported release.

3.22 OPWL P-22

Location. Line P-22 is located north of (EG&G 1990; DOE 1988) and beneath (DOE 1988) Building 771 (Plate 3). The line carried process waste out of the north side of Building 771 to waste storage tank T-8.

Status. P-22 was installed in 1952 (Drawing 7387-2) and was abandoned in 1982 (DOE 1986).

Physical Description. P-22 consists of 6-inch diameter cast-iron pipe (Appendix D; DOE 1986; Rockwell 1976; EG&G 1990; DOE 1988). The total length has been reported to be 1,205 feet (DOE 1986), 1,335 feet (Appendix D), and 85 feet (Rockwell 1976), with an outside length of approximately 83 feet (EG&G 1990). Line P-22 connects to T-8 at Building 728 (DOE 1988), and may connect to Line P-24 (6-inch cast-iron pipe) north of Building 771.

Wastes Transferred. P-22 transported waste from Building 771 (EG&G 1990; DOE 1988). This waste included the following:

- Acids: HNO_3, HF, H_2SO_4, HCl, $C_2H_4O_2$, and H_3PO_4;
- Bases: NH_4OH, NaOH, KOH, CaOH, and magnesium hydroxide (MgOH);
- Solvents: Cyclohexane, xylenes, TCA, TCE, PCE, chloroform, and tri-noctyl phosphine-oxide;
- Radioactive Materials: Various isotopes of Pu, Am, U, and a slight possibility of tritium;
- Metals: Cr, Ta, Ni, Ti, Cu, Hg, Pb, and Cerium (Ce); and

- Others: No. 2 and No. 6 fuel oil, lubricating oil, and a slight possibility of PCBs. Photo laboratory wastes may included sodium sulfide, potassium sulfide, sodium sulfide, sodium sulfate, sodium acetate, ammonium thiocyanate, alum, and Photo-Flo™.

Historical Releases. Releases are known to have occurred at the intersection of P-22 with P-23 and P-24, as well as with T-8 (DOE 1986). In addition, T-8 has been identified on a location map as an area of reported release.

3.23 OPWL P-23

Location. Line P-23 is located north and west of Building 771 (EG&G 1990; DOE 1988) (Plates 2 and 3). The line carried process waste out of the west side of Building 771, turned north and tracked to an elbow west of the guard shack, turned northeast and tracked to an elbow near the manhole northwest of Building 771, turned east and terminated at waste tank T-8 north of Building 771.

Status. According to DOE (1986) and Rockwell (1976), P-23 was installed in 1969 and abandoned in 1982. P-23 is currently an active firewater plenum for Building 771 (1994d).

Physical Description. Line P-23 is constructed of 10-inch-diameter fiberglass pipe (DOE 1986; Rockwell 1976; EG&G 1990; DOE 1988), or a 10-inch stainless-steel pipe (Quayle 1994). The total length of P-23 is listed as 395 feet (DOE 1986; DOE 1985; Rockwell 1976); however, an outside length of approximately 413 feet (EG&G 1990) has also been identified. Line P-23 connects to T-8 at Building 728 (DOE 1988).

Wastes Transferred. P-23 transported waste from Building 771 (EG&G 1990; DOE 1988). This waste included the following:

- Acids: HNO_3, HF, H_2SO_4, HCl, $C_2H_4O_2$, and H_3PO_4;
- Bases: NH_4OH, NaOH, KOH, CaOH, and MgOH;
- Solvents: Cyclohexane, xylenes, TCA, TCE, PCE, chloroform, and tri-noctyl phosphine-oxide;

- Radioactive Materials: Various isotopes of Pu, Am, U, and a slight possibility of tritium;

- Metals: Cr, Ta, Ni, Ti, Cu, Hg, Pb, and Ce; and

- Others: No. 2 and No. 6 fuel oil, lubricating oil, slight possibility of PCBs. Photo laboratory waste may include sodium sulfide, potassium sulfide, sodium sulfide, sodium sulfate, sodium acetate, ammonium thiocyanate, alum, and Photo-Flo™.

Historical Releases. A release is known to have occurred at the intersection of P-23 with P-22 (DOE 1986). In addition, T-8 has been identified on a location map as an area of reported release (DOE 1988).

3.24 OPWL P-24

Location. P-24 is located north of Building 771 and 771C (EG&G 1990; DOE 1988) (Plate 3). Line P-24 exited the east side of Building 728 and tracked east to a location north of Building 771C where P-24 and P-25 intersect.

Status. P-24 was installed in 1966 (DOE 1986; Rockwell 1976), and abandoned in 1982 (DOE 1986). It is reported that P-24 was abandoned in place (DOE 1986).

Physical Description. P-24 consists of 6-inch cast-iron pipe (DOE 1986; Rockwell 1976; EG&G 1990; DOE 1988). The total length has been reported as 306 feet (DOE 1986), 290 feet (DOE 1985), and 180 feet (Rockwell 1976), with an outside length of 295 feet (EG&G 1990). P-24 connects to P-25 (3-inch stainless-steel, cast-iron, and steel pipe [DOE 1986; Rockwell 1976; EG&G 1990; DOE 1988]) at an elbow north of Building 771C. P-24 also connects to the Building 771 waste pits (T-8) in Building 728, and may connect to P-22 (6-inch cast-iron pipe).

Wastes Transferred. The waste stream from Building 771 included the following:

- Acids: HNO_3, HF, H_2SO_4, HCl, $C_2H_4O_2$, and H_3PO_4;
- Bases: NH_4OH, NaOH, KOH, CaOH, and MgOH;
- Solvents: Cyclohexane, xylenes, TCA, TCE, PCE, chloroform, and tri-noctyl phosphine-oxide;
- Radioactive Materials: Various isotopes of Pu, Am, U, and a slight possibility of tritium;

- Metals: Cr, Ta, Ni, Ti, Cu, Hg, Pb, and Ce; and

- Others: No. 2 and No. 6 fuel oil, lubricating oil, slight possibility of PCBs. Photo laboratory waste may include sodium sulfide, potassium sulfide, sodium sulfide, sodium sulfate, sodium acetate, ammonium thiocyanate, alum, and Photo-Flo™ (trade name).

Historical Releases. Reports regarding historical releases from P-24 indicate a release at the intersection of P-24 with P-22 and P-25 (DOE 1986), at both ends of the pipeline identified on the location map area of reported release (DOE 1988), and a leak of 22 gph at 20 psig detected in a 1971 pressure test (ILDS 1971) conducted along lines P-24 and P-25. Further tests disclosed extensive valve leakage accounted for a 7 gph release. Hand probing showed saturation along E-20893, from N-38140 to N-38197. This area is between Buildings 771 and 774, where the new 3-inch line has been joined to the existing 6-inch cast-iron line. North of the new waste packaging facility joining Building 771 and Building 774, in 1971 ILDS found a leak rate of 15 gph at 20 psig at the junction of a 6-inch cast-iron pipe with a 3-inch steel line (Rockwell 1976). The 3-inch steel line was replaced with a 3-inch stainless-steel line when the waste packaging facility was added in 1972. Soil sample No. 9, in Appendix A, showed a level of 3.385 d/m/g of plutonium and a nitrate level of 44 ppm (Rockwell 1976).

3.25 OPWL P-25

Location. P-25 is located north of and beneath Building 771C to the valve vault north of T-29 (Plate 3). Line P-25 originates at the intersection with P-24 north of Building 771C and travels south to an elbow located east of Building 772, turns diagonally southeast and tracks to an elbow located north of Building 712, turns east and travels to an elbow located south of Building 774, turns south and terminates at the valve vault north of tank T-29. Drawing 15507-5 (drawn March 1976 and approved December 1976, is consistent with the P-25 alignment shown in Drawing B-5 of the work plan.

Status. The utility drawing indicates P-25 is a forced-flow process waste line (EG&G 1990). The northern portion of P-25 from the north side of 771C (N-38140, E-20895) to the P-24 intersection (N-38194, E-20897) was originally part of P-34 installed in 1952. This section of pipeline was converted to P-25 in 1972. The portion of pipeline running east of the diagonal section (N-37912, E-20988) to the valve vault north of T-29 (N-37797, E-21076) was installed in 1965 as part of the P-34 realignment. This section of pipeline was converted to P-25 in 1972. The section of pipeline from the east section of the diagonal (N-37912, E-20988) west and north to the north side of Building 771C (N-38140, E-20895) was installed in 1972 to replace P-34 (Drawing 15507-2). It is reported that P-25 was abandoned in place in 1982 (DOE 1986).

Physical Description. P-25 consists of a 3-inch stainless-steel, cast-iron, and steel pipe (DOE 1986; Rockwell 1976; EG&G 1990; DOE 1988). Total length has been reported as 562 feet (DOE 1986), 575 feet (DOE 1985), and 516 feet (Rockwell 1976), with an outside length of 495 feet (EG&G 1990; DOE 1988). P-25 connects to P-24 (6-inch cast-iron pipe) north of Building 771C (EG&G 1990; DOE 1988), P-27/P-28 (3-inch stainless-steel pipe), P-29 (4-inch stainless-steel pipe), P-35 (3-inch steel pipe), and P-46 (3-inch steel pipe).

Wastes Transferred. P-25 received laundry and process waste from Building 771. The waste stream included the following:

- Acids: HNO_3, HF, H_2SO_4, HCl, $C_2H_4O_2$, and H_3PO_4;

- Bases: NH_4OH, NaOH, KOH, CaOH, and MgOH;

- Solvents: Cyclohexane, xylenes, TCA, TCE, PCE, chloroform, and tri-noctyl phosphine-oxide;

- Radioactive Materials: Various isotopes of Pu, Am, U, and a slight possibility of tritium;

- Metals: Cr, Ta, Ni, Ti, Cu, Hg, Pb, and Ce; and

- Others: No. 2 and No. 6 fuel oil, lubricating oil, slight possibility of PCBs. Photo laboratory wastes may include potassium sulfide, sodium sulfide, sodium sulfate, sodium acetate, ammonium thiocyanate, alum, and Photo-Flo™.

Site Walk Information. One valve vault located north of T-29 that is associated with P-25 was inspected in April 1994. The valve vault is approximately 10 feet by 20 feet with a depth of approximately 7 feet. There are two pipes running from north to south (P-27/P-28 and P-29) and three pipes (P-35, P-46, and P-58) running from east to west. The depth to the pipes is approximately 5 feet with approximately 1 foot of water in the bottom of the vault.

Historical Releases. Reports regarding historical releases from P-25 indicate a release at the intersection of P-25 with P-24 (DOE 1986), at the valve vault north of T-29 (DOE 1986), at the north end of the pipeline, at a section beneath Building 771C, at the intersection with P-34, and at the valve vault north of T-29, identified on a location map as an area of reported release (DOE 1988). A leak of 22 gph at 20 psig was also detected during a 1971 pressure test (ILDS 1971) conducted along lines P-24 and P-25. Further testing disclosed extensive valve leakage accounted for a 7 gph release. Hand probing showed saturation along E-20893, from N-38140 to N-38197. This area is between Buildings 771 and 774, where the new 3-inch line has been joined to the existing 6-inch cast-iron line. Leakage occurred north of the valve pit near T-29, west of the propane tanks, north of valve pit near Tank 207 and 2 feet and 10 feet from the pit. Valves at T-29 were also reported to be leaking (Maness 1971h). Total leak rate of the line and the us valves at T-29 was 29 gph (Maness 1971h) and further testing was required to separate the components of the line and the valve. All valves in the T-29 pit are suspect. The testing revealed leakage in several valves (Maness 1971i).

3.26 OPWL P-26

Location. Line P-26 exits the southeast corner of Building 774 and tracks to Solar Evaporation Pond 207-A (Plates 3 and 4). P-26 is composed of two lines and was designed to carry process waste in both directions. Both of the pipes are forced flow. The farther south of the two lines is designed to carry flow away from the Solar Ponds.

Status. P-26 was installed in 1972 (DOE 1986) and abandoned in the late 1970s (DOE 1986). It has been reported that P-26 was abandoned in place (DOE 1986; DOE 1985). The portion of pipeline from the fenceline east of Building 774 to the Solar Ponds will be addressed by OU4, the Solar Ponds site characterization and remediation activities.

Physical Description. P-26 consists of two pipes, reported to be 1.5-inch PVC pipe (DOE 1986; Rockwell 1976; DOE 1988), or one 1.5-inch stainless-steel pipe and one PVC pipe (EG&G 1990). The total length has been reported as 2,750 feet (total) (DOE 1986), 635 feet (each) (DOE 1985), and 1,500 feet (total) (Rockwell 1976), with an outside length of 1,445 feet (EG&G 1990). P-26 does not intersect any other pipelines (EG&G 1990; DOE 1988).

Wastes Transferred. P-26 received waste from Building 774 (EG&G 1990; DOE 1988) and from Solar Evaporation Pond 207-A. This waste stream included the following:

- Acids: HNO_3, H_2SO_4, and HF;
- Bases: NaOH, and KOH;
- Solvents: Small amounts of various solvents;
- Radioactive Materials: Various isotopes of Pu, Am, and U;
- Metals: Fe, Cr, Hg, Ni, and Ta; and
- Others: Chlorides and small amounts of various oils and grease.

Historical Releases. Reports of historical releases from P-26 (DOE 1986) indicate no releases from P-26; however, a leak of radioactive liquid process waste was observed on July 21, 1980, and the entire pipeline has been identified on a location map as an area of reported release (DOE 1988). In addition, on December 15, 1977, water was seeping from the asphalt north of Building 774. The leak was found at the flange joint of a stainless-steel process line (Hornbacher 1977).

Dompierre (1973) reported that a contractor broke the plastic line that runs from the Solar Evaporation Ponds to Building 774. After repairs were made and water was again being drawn from the ponds, hot salts were generated.

During the morning of July 21, 1980, water was observed seeping up in the soil on the south side of the road (the road southeast of Building 774). The cause was a break in the pipe carrying process waste from Building 774 to the Solar Evaporation Ponds. The leaking process wastewater flowed down a slope through a 30-foot culvert, along the east chain-link fence, and under the fence at the corner. From there, the liquid flowed under the unpaved access road into a boggy area north of Building 774. Approximately 1,000 gallons leaked onto the hillside. The sampling indicated 2,500 pCi/L total alpha, 4,000 pCi/L gross beta, 10,000 milligrams per liter (mg/L) nitrate, and a pH of 12 (Illsley 1980).

The vegetation was damaged in the boggy area where the spill formed a pool. Natural recovery was expected to proceed during the spring and summer of 1981 (Illsley 1980). Further plans called for the abandonment of this process waste line as soon as Building 374 was fully operational.

On July 24, 1980, the broken line was excavated and the source of the leak was found to be a loose flange. A new gasket was installed, the flange nuts were tightened, and the line passed a leak test. Soil removal with a tractor-mounted backhoe began the morning of July 28, 1980. No further information regarding the amount of soil removed has been found.

3.27 and 3.28 OPWL P-27/P-28

Location. Line P-27 is the northern portion of the line that runs between T-29 and Building 774. Line P-28 is the southern portion of the line that runs between T-29 and Building 774 (Plate 3). P-27/P-28 parallels P-29. The northern portion, P-27, tracks north to an elbow located northeast of storage tank T-14 east of Building 774, turns west and tracks between storage tanks T-14 and T-16 to Building 774 piping (Drawing 38544-X10). Drawing 23544-207 (originally drawn May 1972, as-builts drawn September 1974), shows the process waste detail directly south of Building 774. The original alignment of P-27/P-28 is shown in Drawing 5703-74D (originally drawn September 1952, as-builts drawn May 1953). This drawing indicates that the northern portion of P-27 had a somewhat different alignment: at N37995, P-27 turns northwest at 45 degrees for 25 feet and then tracks west to an elbow, turns north, and tracks between T-17 and T-14 to Building 774. This section of pipeline was abandoned in 1968 when the south addition to Building 774 was constructed.

Status. Both P-27/P-28 were installed in 1952 and abandoned in 1982 (EG&G 1994c). It has been reported that P-27/P-28 were abandoned in place (DOE 1985).

Physical Description. The original P-27/P-28 consisted of a 3-inch cast-iron pipe (Drawing 15507-5). In 1968, P-27 (the northern portion) was realigned, and 3-inch stainless-steel pipe (DOE 1986; Rockwell 1976) was installed. In 1972, the southern portion of P-28 was replaced with a 3-inch stainless-steel pipe (DOE 1986; Rockwell 1976). The total length of P-27 has been reported as 185 feet (DOE 1986) and 195 feet (DOE 1985), with an outside length of 125 feet (EG&G 1990). The total length of P-28 has been reported as 111 feet (DOE 1986; Rockwell 1976) and 115 feet (DOE 1985), with an outside length of 128 feet (EG&G 1990). The southern section at the valve vault connects to P-25 (3-inch stainless-steel and cast-iron pipe), P-35 (two 3-inch steel pipes [DOE 1986; DOE 1985; EG&G 1990; DOE 1988]), P-43

(3-inch steel pipe), P-46 (3-inch steel pipe [EG&G 1990; DOE 1988]), P-58 (3-inch black iron pipe [Drawing #14267-9]), and T-29. The northern section connects to Building 774.

Wastes Transferred. P-27/P-28 received waste from Building 774. This waste stream included the following:

- Acids: HNO_3, H_2SO_4, and HF;
- Bases: NaOH and KOH;
- Solvents: Small amounts of various solvents;
- Radioactive Materials: Various isotopes of Pu, Am, and U;
- Metals: Fe, Cr, Hg, Ni, and Ta; and
- Others: Chlorides, and small amounts of various oils and grease.

Site Walk Information. Two valve vaults associated with P-27/P-28 were investigated in April 1994. The large valve vault is approximately 10 feet by 20 feet with a depth of approximately 8 feet. There are two pipes (P-27/P-28 and P-29) running from north to south and three pipes (P-35, P-46, and P-58) running from east to west. The depth to the pipes is approximately 5 feet with approximately 1 foot of water in the bottom of the vault. The smaller valve vault is approximately 3 feet by 3 feet with a depth of approximately 8 feet. Two pipes are visible running north to south. One of the pipes connects to a pipe running up the side of T-29, and the other branches into two pipelines. One of the branched pipelines exits the valve vault to the east, and the other is cut and blanked. The depth of the pipes is approximately 5 feet with approximately 4 feet of water.

Historical Releases. Reports regarding historical releases from P-27/P-28 indicate a release at the intersection of P-27 with P-28 (DOE 1986). In addition, the entire pipeline was identified on a location map as an area of reported release (DOE 1988). This includes the old cast-iron lines between Building 774 and the valve pit north of T-29. A pressure test conducted in 1971 indicated that the 3-inch line leaked 14 gph at 20 psig (ILDS 1971). The line was replaced in April 1972 (DOW 1971).

Maness (1971i) reported that a 3-inch pipe from Building 774 to the valve pit was tested. A leak of approximately 14 gph was measured. Some of the leaking was due to faulty valves; however, test probing for nitrous oxide leaks during testing revealed several major leaks. These leaks occurred in the cast-iron section of these pipes just north of the T-29 valve pit. The newer stainless-steel portion of the line (approximately 70 feet south of Building 774) was not leaking (Beck 1971e).

An investigation of a process drain line from a process waste storage tank (located between Buildings 777 and 779) to Building 774 was conducted. The cast-iron pipe had failed at the bell and spigot lead joints because of the movement caused by road excavation. No corrosion problems occurred either on the mild steel storage tank or the cast-iron pipe; both handled only treated (high pH) process waste (Briggs 1971).

3.29 OPWL P-29

Location. Line P-29 runs between T-29 and Building 774 (Plate 3). P-29 tracks from the small valve vault located north of storage tank T-29 north through the large valve vault north of T-29 to an elbow located northeast of T-14, turns west, and tracks between T-14 and T-16 to Building 774 piping (Drawing 38544-X10). P-29 and P-27/P28 parallel each other. Drawing 23544-207, (originally drawn May 1972, as-builts drawn September 1974) and Drawing 5703-74D show the process waste detail directly south of Building 774. The original alignment of P-29 is shown in Drawing 5703-74D, (originally drawn September 1952, as-builts drawn May 1953). This drawing indicates that the northern portion of P-29 had a somewhat different alignment. At N37995, P-27 turns northwest at 45 degrees for 25 feet and then tracks west to an elbow, turns north, and tracks between T-17 and T-14 to Building 774. This section of pipeline was abandoned in 1968 when the south addition to Building 774 was constructed.

Status. P-29 was installed in 1952 and abandoned in 1982 (EG&G 1994c). It has been reported that P-29 was abandoned in place (DOE 1986).

Physical Description. According to Drawing 5703-74D (originally drawn September 1952, as-builts drawn May 1953), the original P-29 piping was a 4-inch cast-iron pipe. In 1968, the northern section of P-29 was converted to a 4-inch stainless-steel pipe (DOE 1986; EG&G 1990; DOE 1988). The total length of P-29 is 197 feet (DOE 1986), with an outside length of 130 feet (EG&G 1990). P-29 connects to P-58 (3-inch black iron pipe [drawing #14267-9]), P-60 (4-inch black-iron pipe), and P-61 (4-inch vitrified-clay pipe). P-29 also connects to T-14 and T-16 near Building 774 (DOE 1988).

Wastes Transferred. P-29 received waste from Building 774 (EG&G 1990; DOE 1988). This waste stream included the following:

- Acids: HNO_3, H_2SO_4, and HF;
- Bases: NaOH, and KOH;
- Solvents: Small amounts of various solvents;
- Radioactive Materials: Various isotopes of Pu, Am, and U;
- Metals: Fe, Cr, Hg, Ni, and Ta; and
- Others: Chlorides and small amounts of various oils and grease.

Site Walk Information. Two valve vaults associated with P-29 were investigated in April 1994. The large valve vault north of T-29 is approximately 10 feet by 20 feet with a depth of approximately 8 feet. Two pipes (P-27/P-28 and P-29) run from north to south, and three pipes (P-35, P-46, and P-58) run from east to west. The depth to the pipes is approximately 5 feet with approximately 1 foot of water in the bottom of the vault. The smaller valve vault north of T-29 is approximately 3 feet by 3 feet with a depth of approximately 8 feet. Two pipes running north to south are visible. One of the pipes connects to a pipe running up the side of T-29, and the other branches into two pipelines. One of the branched pipelines exits the valve vault to the east, and the other is cut and blanked. The depth of the pipes is approximately 5 feet with approximately 4 feet of water in the vault.

Historical Releases. Reports regarding historical releases from P-29 contain the following information regarding the releases: none (DOE 1986); the entire pipeline (DOE 1988); the area around T-14 and T-16 identified on a location map (DOE 1988); and a leak of 45 gph at 20 psig detected in a 1971 pressure test (ILDS 1971).

3.30 OPWL P-30

Location. Line P-30 is located beneath and north of Buildings 776 and 777 (Plate 3). According to Drawing 26378-X01, P-30 exits Building 776 at N-37637, E-20769 and tracks north and terminates at Building 730 (N-37710, E-20769) (DOE 1988). The original P-30 also has an associated spur, P-30.1. P-30.1 exits Building 777 at N-37669, E-20798; tracks west; and connects to the north-south P-30 pipeline at N-37669, E-20770. P-30.2, another spur alignment, exits the northwest corner of Building 777 at N-37673, E-20807; tracks north; turns west at the pipe elbow N-37678, E-20807; and connects to the north-south P-30 pipeline at location N-37678, E-20769. P-30.2 is not identified in the OU9 work plan.

Status. The original P-30 pipeline was installed in 1957 (DOE 1986). P-30.1 was abandoned in 1981, and P-30.2 was installed. It has been reported that P-30, P-30.1, and P-30.2 were abandoned in place in 1982 (Appendix E; DOE 1986; DOE 1985). According to Drawing 25618-5, the northern section of P-30 from N-37678, E-20769 north to Building 730 (N-37710, E-20769) is currently part of the firewater plenum system for Buildings 776 and 777.

Physical Description. P-30 consists of a 4-inch steel pipe (DOE 1986), 2-, 3-, 4-, and 6-inch pipe (Appendix D), and 4- and 6-inch steel pipe (EG&G 1990; DOE 1988). The total length has been reported as 667 feet (DOE 1986), and 1,377 feet (Appendix D), with an outside length reported as 70 feet (DOE 1985), and 100 feet (EG&G 1990). P-30 connects to T-9 and T-10 at Building 730 (DOE 1988). P-30.1 consists of 3-inch stainless-steel pipe. Total length has been reported as 25 feet (Drawing 24615-4). P-30.2 consists of a 3-inch stainless-steel pipe (Drawing 24615-3). The total length of the spur has been reported as 50 feet with an outside length of 45 feet (Drawing 24615-3).

Wastes Transferred. P-30, P-30.1, and P-30.2 received waste from Buildings 776 and 777 (EG&G 1990; DOE 1988). This waste included the following:

- Acids: None identified;
- Bases: None identified;
- Solvents: CCl_4, TCA, TCE, and toluene;
- Radioactive Materials: Various isotopes of Pu, and Am, and tritium (no U);
- Metals: Cd and Cr; and
- Others: Small amounts of machining and lubrication oils.

Historical Releases. No historical releases have been reported for this line (DOE 1986).

3.31 OPWL P-31

Location. Line P-31 is located in the piping tunnel between Buildings 771 and 774 south of Building 771C (DOE 1988) (Plate 3). The tunnel was constructed in 1952, has an interior area of less than 2 feet square, and is constructed of 8-inch thick concrete slabs.

Status. The original P-31 was installed in 1952. According to Drawing 1-8256-71, in 1961 the original process waste piping in the tunnel was removed and replaced. According to Drawings 26629-1 and 26629-2, in 1983 the piping in the tunnel was again removed and replaced with PVC piping. The new piping installed in 1983 is associated with the new transfer system and is referenced as P-56 according to the OU9 work plan. Any activities at the tunnel will be guided by OU8 activities.

Physical Description. From 1952 to 1961, P-31 consisted of three pipes: 1/5-inch, 1-inch and 2-inch stainless-steel pipes (Drawing 1-8256-71). According to Drawings 26629-1 and 26629-2, from 1961 to 1983 P-31 consisted of a 2-inch and a 3-inch PVC pipe. The total length has been reported as 167 feet (DOE 1986) with an outside length of 170 feet (DOE 1988). P-31 connects to P-22 (6-inch cast-iron pipe) at Buildings 771 and 774 (DOE 1988).

Wastes Transferred. P-31 transferred waste between Buildings 771 and 774 (EG&G 1990; DOE 1988). This waste stream included the following:

- Acids: HNO_3, HCl, H_3PO_4, H_2SO_4, HF, and $C_2H_4O_2$;

- Bases: NaOH, KOH, NH_4OH, MgOH, and CaOH;

- Solvents: Small amounts of various solvents, chloroform, TCA, TCE, PCE, cyclohexane, xylene, and tri-noctyl phosphine-oxide;

- Radioactive Materials: Various isotopes of Pu, Am, U, and a slight possibility of tritium;

- Metals: Pb, Cr, Hg, Ni, Ta, Ti, Ce, and Cu; and

- Others: Chlorides, small amounts of various oils and grease, No. 2 and No. 6 fuel oil, lubricating oil, and a slight possibility of PCBs. Photo laboratory waste may have included sodium sulfide, potassium sulfide, sodium sulfate, sodium acetate, ammonium thiocyanate, alum, and Photo-Flo™.

Historical Releases. Reports indicate no releases from P-31 (DOE 1986); however, contamination within the pipe tunnel has been observed (Appendix D), and EG&G (1994c) has reported many releases resulting in a highly contaminated tunnel.

3.32 OPWL P-32

Location. Line P-32 is located north of Building 778 (EG&G 1990; DOE 1988) and beneath and north of Building 777 (EG&G 1990; DOE 1988) (Plates 3 and 6). P-32 originates at T-18 in Building 778, tracks east in the courtyard to an elbow located west of the transformer, then turns north and terminates at Building 730.

Status. P-32 was installed in 1957 (DOE 1986) and abandoned in 1982 (DOE 1986). It has been reported that P-32 was decontaminated, removed, and replaced with inspectable pipe (DOE 1986), abandoned in place (DOE 1985), or portions abandoned after December 15, 1977 (Appendix D).

Physical Description. P-32 consists of a 6-inch vitrified-clay and steel pipe (DOE 1986), 4-inch steel and 6-inch cast iron pipe (Appendix D), 6-inch cast-iron (Rockwell 1976), and 4-inch cast-iron and 6-inch steel pipe (EG&G 1990; DOE 1988). The total length has been reported as 907 feet (DOE 1986) and 535 feet (Appendix D). The outside length has been reported as 72 feet (Rockwell 1976), 70 feet (DOE 1985), and 115 feet (EG&G 1990). P-32 connects to T-9 and T-10 in Building 730 (DOE 1988) and to T-18 in Building 778 (DOE 1988).

Wastes Transferred. P-32 received waste from Building 778. This waste stream included laundry water containing detergent, Pu, Am, and U. No releases have been reported from P-32 (DOE 1986).

3.33 OPWL P-33

Location. P-33 is located between Buildings 771 and 774 (Plate 3). Line P-33 is the original process waste line for Building 771, originating at Manhole 1 near the northwest corner of Building 771 and continuing east to Building 774 (Drawing 4185).

Status. P-33 was installed during the construction of Building 771 in 1952 (Drawing 7387-2). The eastern section of the pipeline near Building 774 was capped and abandoned in 1959 (Drawing 4185). The western section of the pipeline was removed in the early 1960s because of additions on the north side of Building 771. The remaining small section of P-33 was used (from N-38140, E-20895 to N-38140, E-20912) as part of the laundry waste line from Building 771 to T-29. It has been reported that this section of P-33 was abandoned in 1972 (DOE 1986).

Physical Description. P-33 consisted of 3-inch steel pipe (DOE 1986). The total length has been reported as 142 feet (DOE 1986) with an outside length of 140 feet (EG&G 1990). P-33 connects to P-22 (6-inch cast-iron pipe) at Building 771 (DOE 1988) and to P-34 (3-inch steel pipe) north of Building 771C (EG&G 1990; DOE 1988).

Wastes Transferred. P-33 received waste from Buildings 771 (EG&G 1990; DOE 1988). This waste stream included the following:

- Acids: HNO_3, HCl, H_3PO_4, H_2SO_4,, HF, and $C_2H_4O_2$;
- Bases: NaOH, KOH, NH_4OH, MgOH, and CaOH;
- Solvents: Small amounts of various solvents, chloroform, TCA, TCE, PCE, cyclohexane, xylene, and tri-noctyl phosphine-oxide;

- Radioactive Materials: Various isotopes of Pu, Am, U, and a slight possibility of tritium;

- Metals: Pb, Cr, Hg, Ni, Ta, Ti, Ce, and Cu; and

- Others: Chlorides, small amounts of various oils and grease, No. 2 and No. 6 fuel oil, lubricating oil, and a slight possibility of PCBs. Photo laboratory waste may have included sodium sulfide, potassium sulfide, sodium sulfate, sodium acetate, ammonium thiocyanate, alum, and Photo-Flo™.

Historical Releases. No releases have been reported from P-33 (DOE 1986).

3.34 OPWL P-34

Location. Line P-34 is located south of and beneath Buildings 771C and 774 (EG&G 1990; DOE 1988) (Plate 3). P-34 originated at the intersection with P-24 north of Building 771C, tracked south to the tie into the section of P-33 north of Building 771C, turned east and tracked to an elbow (P-33), turned south and tracked to an elbow located south of Building 771C, turned east and tracked to an elbow west of tanks T-15 and T-17 in Building 774, turned south and tracked to an elbow north of Building 712, turned east and tracked to an elbow south of 774, and turned south terminating at the large valve vault located north of T-29. P-34.1 is a section of the original P-34 pipeline starting at a location north of Building 712 (N-37912, E-20988), extending south to a location west of Building 712 (N-37798, E-20988), turning east and terminating at the large valve vault north of T-29 (N-37798, E-21072).

Status. P-34 was installed in 1952 (DOE 1986). The section of pipeline located north of Building 771C (N-38194, E-20897 to N-38140, E-20895) was installed in 1959 (Drawing 4185) and converted to P-25 in 1972. The section of pipeline north of Building 771C (N-38140, E-20895 to N-38140, E-20912) was originally part of P-33, which was installed in 1952. This section was converted to P-34 in 1959 (Drawing 4185). The section of pipeline running east of the diagonal section (N-37912, E-20988) to the valve vault north of T-29 (N-37797, E-21076) was installed in 1965 as part of the P-34 realignment that was designated as P-25 in 1972. The pipeline section P-34.1 is not identified in the OU9 work plan. According to Drawings 14267-9 and 3763-207, P-34.1 was installed in 1952 and abandoned in 1965. It is not known whether P-34.1 was removed for construction activities. It has been reported that P-34 was abandoned in place in 1972 (DOE 1986).

Physical Description. P-34 consists of a 3-inch stainless-steel pipe (DOE 1986) or a 3-inch steel pipe (EG&G 1990; DOE 1988). Total length has been reported as 127 feet (DOE 1986) and

130 feet (DOE 1986). The outside length has been reported as 198 feet (EG&G 1990). P-34 connects to P-24 (6-inch cast-iron pipe) north of Building 771C, P-34.1 (3-inch black-iron pipe) south of Building 774, P-25 (3-inch cast-iron and steel pipe) south of Building 774 (EG&G 1990; DOE 1988) and P-33 (3-inch steel pipe) north of Building 771C (EG&G 1990; DOE 1988). P-34.1 consisted of 3-inch black-iron pipe (Drawing 14267-9). The total length has been reported as 83 feet (Drawing 14267-9). P-34.1 connected to P-46 (3-inch stainless-steel pipe) at the large valve vault north of T-29.

Wastes Transferred. P-34 and P-34.1 received waste from Buildings 771 and 774 (EG&G 1990; DOE 1988). This waste stream included the following:

- Acids: HNO_3, HCl, H_3PO_4, H_2SO_4, HF, and $C_2H_4O_2$;
- Bases: NaOH, KOH, NH_4OH, MgOH, and CaOH;
- Solvents: Small amounts of various solvents, chloroform, TCA, TCE, PCE, cyclohexane, xylene, and tri-noctyl phosphine-oxide;
- Radioactive Materials: Various isotopes of Pu, Am, U, and slight possibility of tritium;
- Metals: Pb, Cr, Hg, Ni, Ta, Ti, Ce, and Cu;
- Others: Chlorides, small amounts of various oils and grease, No. 2 and No. 6 fuel oil, lubricating oil, and a slight possibility of PCBs. Photo laboratory waste may have included sodium sulfide, potassium sulfide, sodium sulfate, sodium acetate, ammonium thiocyanate, alum, and Photo-Flo™.

Historical Releases. Releases from P-34 have been reported at the intersection with P-33 (DOE 1986) and at the intersection with P-25. T-15 and T-17 have also been identified on a location map as an area of reported release (DOE 1988).

3.35 OPWL P-35

Location. Line P-35 consists of two pipelines (DOE 1985; EG&G 1990; DOE 1988) that run from the large valve vault north of T-29 east to Solar Evaporation Pond 207-C (Plate 3). P-35 also has a spur associated with it tracking from the valve vault northeast of T-29 south to the manhole located northeast of T-29. Drawing 3763-207, drawn in June 1956, indicates that this line as well as the parallel line P-46 are sloped for gravity flow toward Pond 207-C. Because Solar Pond 207-C was not installed until 1970, line P-35 most likely carried process waste to Solar Pond 2, which was present at the time, and was located approximately coincident with the western half of current Solar Pond 207-C.

Status. P-35 was installed in 1952 and abandoned in 1982 (DOE 1986). It has been reported that P-35 has been abandoned in place (DOE 1985). The section of P-35 east of the fenceline will be addressed by OU4, the Solar Ponds site characterization and remediation activities.

Physical Description. P-35 consists of a 3-inch steel pipe (DOE 1986) or two pipes, both 3-inch steel (DOE 1985; EG&G 1990; DOE 1988). The total length has been reported as 144 feet (DOE 1986) and 135 feet (DOE 1985) with an outside length of 142 feet (each) (EG&G 1990). P-35 connects to P-25 (3-inch stainless-steel, cast-iron and steel pipe), P-27/P-28 (3-inch stainless-steel pipe), P-43 (3-inch steel pipe), P-46 (3-inch steel pipe), P-38 (10-inch vitrified-clay pipe), and P-58 (3-inch black-iron pipe) (Drawing 14267-9).

Wastes Transferred. P-35 received laundry waste from Buildings 774, 776, 777, 778, and 779. This waste stream included the following:

- Acids: HNO_3, HCl, H_3PO_4, H_2SO_4, HF, H_2CrO_4, and oxalic;

- Bases: NaOH, KOH, NH_4OH, and CaOH;

- Solvents: Small amounts of various solvents, alcohols, acetone, chloroform, TCA, TCE, PCE, xylene, toluene, freon, and kerosene;

- Radioactive Materials: Various isotopes of Pu, Am, U, and a slight possibility of tritium;

- Metals: Hg, Be, Cr, Ni, Au, Cd, Pb, Fe, Ag, Pt, Ti, Ta, Zn, Cu, Sn, W, Mn, and Mg; and

- Others: Chlorides, small amounts of various oils and grease, and lubricating oil.

Site Walk Information. Two valve vaults and one manhole associated with P-35 were investigated in March 1994. The large valve vault located north of T-29 is approximately 10 feet by 20 feet with a depth of approximately 7 feet. Two pipes (P-27/P-28 and P-29) run from north to south, and three pipes (P-35, P-46, and P-58) run from east to west. The depth to the pipes is approximately 5 feet with approximately 1 foot of water in the bottom of the vault. The valve vault located northeast of T-29 is approximately 10 feet by 10 feet with a depth of approximately 8 feet. Three pipes (P-35 and P-46) enter the vault from the west, and two pipes exit the vault to the south. Approximately 6 inches of water exist in the bottom of the vault. The manhole located to the northeast of T-29 is approximately 4 feet by 4 feet with an approximate depth of 8 to 10 feet. Two 4-inch pipes (P-35 and P-46) approximately 5 feet from the bottom of the manhole enter from the north, and one 10-inch open top vitrified-clay pipe (P-61) runs from west to east at the bottom of the manhole. The two 4-inch pipes that enter from the north appear to dump into the manhole, and the 10-inch pipe directs the liquid out of the manhole.

Historical Releases. Reported releases have occurred at the intersection of P-35 with P-25 (DOE 1986). In addition, the valve vault north of T-29 has been identified as an area of reported release (DOE 1988).

3.36 OPWL P-36

Location. P-36 is located from southwest of T-29 to Pond 207-A (Plates 3 and 4). P-36 originates at the valve vault southwest of Building 703, tracks east, turns south to the valve vault southwest of T-29, and then east to solar evaporation pond 207-A. It is assumed that P-36 is a gravity-flow pipeline.

Status. P-36 was installed in 1965 and abandoned in 1982 (DOE 1986). It has been reported that P-36 was abandoned in place (DOE 1986).

Physical Description. P-36 consists of 3-inch PVC and stainless-steel pipe (DOE 1986; EG&G 1990; DOE 1988). Total length has been reported as 599 feet (DOE 1986) and 530 feet (DOE 1985) with an outside length of 513 feet (EG&G 1990). P-36 connects to P-14 (3-inch Saran-lined steel pipe inside a 10-inch vitrified-clay pipe), P-20 (3-inch stainless-steel pipe), P-21 (3-inch stainless-steel pipe), and P-48 (cast-iron pipe) near the valve vault west of Pond 207-A.

Wastes Transferred. P-36 received waste from Buildings 123, 441, 444, 559, 707, 729, 865, 881, 883, 865, and 889 (Appendix D; EG&G 1990; DOE 1988). This waste stream included the following:

- Acids: HNO_3, HF, H_2SO_4, HCl, $C_2H_4O_2$, $HClO_4$, H_3PO_4, H_2CrO_4, oxalic, and cyanic;
- Bases: NH_4OH, NaOH, KOH, NH_4OH, and CaOH;
- Solvents: Acetone, alcohols, cyclohexane, toluene, xylenes, triisooctomine, ether, TCA, TCE, PCE, freon, CCl_4, chloroform, chloroethane, and paint solvents (trade names PASO, PESO);

- Radioactive Materials: Various isotopes of Pu, Am, U, Cm, and possibly Np-237;

- Metals: Ag, Au, Cr, Ta, Ni, Cd, Pt, Pb, Ti, Zn, Cu, Ca, Sn, W, Fe, Hg, Mo, Mn, Li, and Be (trace amounts); and

- Others: Ammonium thiocyanate, ethylene glycol, possibly PCBs, fluoride, chloride, lubricating oil, cutting oil, lathe coolant (oil and CCl_4), hydraulic oil, and Oakite (cleaning solution).

Site Walk Information. Three valve vaults are associated with P-36. The valve vault located southwest of Building 703 contained a 10-inch vitrified-clay pipe that exited the north and south sides. The east and west walls of the valve vault were not visible at the time of inspection. All piping in the vault was cut at the wall and removed. The depth of the vault is approximately 10 feet with approximately 6 feet of water. The valve vault located southwest of T-29 was covered with soil and was not investigated. The valve vault located west of Solar Pond 207-A is approximately 4 feet by 4 feet with a depth of approximately 5 feet. The valve vault contained four pipes. Two pipelines run from west to east continuing to the Solar Pond, and two pipelines exit the south side of the vault. One of the pipelines exiting the south side of the vault was cut and blanked.

Historical Releases. Historical reports for P-36 indicate releases at the intersection of P-36 with P-20 (DOE 1986) and at the valve vault west of Pond 207-A, identified on a location map as an area of reported release (DOE 1988). P-36 from the valve vault southwest of Building 703 to Solar Pond 207-A was tested by ILDS in 1971 (ILDS 1971). Results of testing did not indicate any leaks (Beck 1971f).

3.37 OPWL P-37

Location. Line P-37 originates at tanks T-9 and T-10 in Building 730, tracks east to the valve vault southwest of T-29, and continues east to Solar Pond 207-A (Plates 3, 4, and 7). P-37 has a spur that starts at the valve vault located west of 207-A, runs south to a manhole located east of Building 782, turns east, and continues to Solar Pond 207-B. The original P-37 pipeline alignment started at Building 730, tracked east to the valve vault southwest of T-29, turned southeast and tracked to location N-37449, E-21247, beneath Building 779, turned east, and terminated at Solar Pond 207-B. The location of P-37 as it goes south of Pond 207-A is unclear. The closure plan (DOE 1988) indicates a continuation to Pond 207-B. Utility drawings (EG&G 1990) suggest a connection west of Pond 207-B to a 3-inch cement-asbestos and PVC pipe terminating at Building 910. The cement asbestos and PVC pipes have not been identified as an OPWL. According to Drawing 14602-1, the section of pipeline from the northwest corner of Building 779, southeast and east to the manhole east of Building 782 was removed when Building 779 was constructed. The section of pipeline from the valve vault southwest of T-29 and southeast to the northwest corner of Building 779 remained in use and is part of P-42.

Status. P-37 was installed in 1957 (DOE 1986; Rockwell 1976). According to Drawing 14602-1, the relocation of P-37 occurred in 1965. It has been reported that P-37 was abandoned in place in 1982 (DOE 1986). The closure plan (DOE 1988) indicates that several sections of P-37 have been removed.

Physical Description. P-37 consisted of 3-inch steel, PVC, and vitrified-clay pipe (DOE 1986; EG&G 1990; DOE 1988), 3-inch pipe (Appendix D), and 3-inch steel pipe (Rockwell 1976). Total length has been reported as 1,449 feet (DOE 1986), 1,500 feet (DOE 1985), and 1,055 feet (Rockwell 1976) with an outside length of approximately 1,350 feet (EG&G 1990). P-37 connects to P-42 (3-inch stainless-steel pipe [Appendix D; Rockwell 1976; EG&G 1990; DOE

1988]), P-44 (3-inch steel pipe [DOE 1986]), P-47 (3-inch cement-asbestos pipe), P-59 (3-inch black-iron pipe), and T-9 and T-10 at Building 730 (DOE 1988).

Wastes Transferred. P-37 received waste from Buildings 774, 776, 777, 778, and 779. This waste stream included the following:

- Acids: HNO_3, HCl, H_2SO_4, H_3PO_4, HF, H_2CrO_4, and oxalic;
- Bases: NH_4OH, NaOH, KOH, and CaOH;
- Solvents: Alcohols, CCl_4, TCA, TCE, PCE, acetone, chloroform, xylenes, toluene, freon, and kerosene;
- Radioactive Materials: Various isotopes of Pu, Am, and U, and tritium;
- Metals: Hg, Be, Ni, Cd, Cr, Au, Pb, Fe, Ag, Pt, Ti, Ta, Zn, Cu, Sn, W, Mn, and Mg; and
- Others: Chlorides, possible lubricating oil, various oils and grease.

Site Walk Information. Two valve vaults are associated with P-37. The valve vault located southwest of T-29 was covered with soil and could not be investigated. The valve vault located west of Solar Pond 207-A is approximately 4 feet by 4 feet with a depth of approximately 5 feet. The valve vault contained four pipes. Two pipelines run from west to east continuing to the Solar Pond, and two pipelines exit the south side of the vault. One of the pipelines exiting the south side of the vault was cut and blanked.

Historical Releases. Maness (1971a) reported historical releases from P-37. Maness described this area tested as having dual lines, 3-inch stainless-steel and 3-inch steel pipes from the valve pit on the west side of Pond 207-A, 675 feet southward and east to the valves on the south edge of Pond 207-B. In addition, releases have been reported at the intersection of P-37 with P-20, P-36, and P-38. The north half of the line west of Pond 207-A has also been identified as an area of release.

The testing of the stainless-steel pipe and the black-iron pipe was inconclusive because of a short testing time. The lines were judged to be acceptable based on the small amount of pressure drop during the short test time. The lines were also deemed acceptable in the direction toward Building 779. Beck (1971g) concluded that it was highly unlikely that any line leaks existed.

The valves to the north of Building 777 (N 37715, E 21055) were leaking at a rate of 25 gph at 20 psig. A valve pit was constructed in May 1974. Appendix A references the soil sample taken in the area as soil sample No. 6 (Rockwell 1976).

3.38 OPWL P-38

Location. Line P-38 runs from the valve vault northeast of T-29 to south of Pond 207-A (Plates 3, 4, and 6). According to Dow Drawing 5703-3, issued in February 1953, the original P-38 pipeline exited the manhole located northeast of T-29 (N-37785, E-21130) to the southeast and continued southeast under Building 779 to a point near the southwest corner of Building 782 (N-37400, E-21403). From this point, the pipeline turns and goes directly east and terminates at the intersection of P-39 southeast of Building 782 (N-37400, E-21490). The construction of Building 779 prompted the realignment of P-38. It is not known if all of the pipeline was removed. Former RFETS employees have stated that this line was encountered during an excavation on July 7, 1988, just to the east of Building 779. The new alignment of P-38 originated at the same manhole located northeast of T-29, exited the manhole tracking to the southeast to an elbow in the middle of the road north of Building 779, turned east tracking to the manhole located west of 207-A, turned south tracking to a point located southeast of Building 782 (Drawing 15501-013-M and Drawing 5703-3). P-38 is listed as a gravity-flow line.

Status. The original P-38 pipeline was installed in 1952 (DOE 1986) and was abandoned or removed in the mid-1960s. The realignment of P-38 took place in the mid-1960s, and the line was abandoned in 1982 (DOE 1986; DOE 1985). The closure plan (DOE 1988) does not indicate the configuration of this pipe.

Physical Description. According to the 1952 drawing, the original P-38 pipeline consisted of a 6-inch vitrified-clay pipe. The newer P-38 pipeline consisted of 10-inch vitrified-clay pipe (Appendix D; Drawing 14602-1). Total length has been reported as 800 feet (DOE 1986), 700 feet (DOE 1985), and 660 feet (Appendix D). Line P-38 connects to P-35 (3-inch steel pipe), P-46 (3-inch steel pipe) P-45 (6-inch vitrified-clay pipe), P-61 (4-inch vitrified-clay pipe), and P-39 (6-inch vitrified-clay pipe).

Wastes Transferred. P-38 transferred waste from Buildings 703, 774, 776, 777, 778, and 779. This waste stream included the following:

- Acids: HNO_3, HCl, H_2SO_4, H_3PO_4, HF, H_2CrO_4, and oxalic;
- Bases: NH_4OH, NaOH, KOH, and CaOH;
- Solvents: Alcohols, CCl_4, TCA, TCE, PCE, acetone, chloroform, xylenes, toluene, freon, and kerosene;
- Radioactive Materials: Various isotopes of Pu, Am, U, and tritium;
- Metals: Hg, Be, Ni, Cd, Cr, Au, Pb, Fe, Ag, Pt, Ti, Ta, Zn, Cu, Sn, W, Mn, and Mg; and
- Others: Chlorides and possibly lubricating oil.

Site Walk Information. Two manholes associated with P-38 were investigated in March 1994. The first manhole, located northeast of T-29, is approximately 4 feet by 4 feet with an approximate depth of 8 to 10 feet. Two 4-inch pipes are located approximately 5 feet from the bottom of the manhole entering from the north (P-35 and P-46) and one 10-inch open-top vitrified-clay pipe (P-61) running from west to east at the bottom of the manhole. The two 4-inch pipes entering from the north appear to dump into the manhole, and the 10-inch pipe directs the liquid out of the manhole. The second manhole located west of Solar Pond 207-A is approximately 6 feet by 6 feet by 5 feet deep. One 10-inch open-flow channel vitrified-clay pipe enters the manhole from the west and exits to the south. The depth of the pipe is approximately 4 feet from the ground surface.

Historical Releases. Releases from P-38 have been reported in the area north of P-38 and west of Evaporation Pond 207-A (DOE 1988).

3.39 OPWL P-39

Location. Line P-39 is located south of Pond 207-A and extends to south of Building 988 (EG&G 1990; DOE 1988) (Plates 7, 8, and 9). P-39 originates at the intersection of P-39 and P-38 located southeast of Building 782 and continues east along the southern edge of Ponds 207-A and 207-B. The pipeline turns slightly to the southeast at the manhole located southeast of Pond 207-B and continues to another manhole located northeast of Building 990 where it intersects pipeline P-40. The pipeline then turns southeast again and continues to the manhole located south of Building 995. The closure plan (DOE 1988) indicates that P-39 has a south-trending branch (approximately 72 feet) to Building 990 in Area C-7 and a south-trending branch (approximately 127 feet) west of Building 988 in Area C-8. The branches were not indicated in the utility plan.

Status. P-39 was installed in 1952 (Drawing 5703-3). Other reports indicate installation was in 1957 (DOE 1986). P-39 was abandoned in place in 1982 (DOE 1986).

Physical Description. P-39 consists of 6-inch-diameter vitrified-clay pipe (Appendix D; DOE 1986; EG&G 1990; DOE 1988). The total length of P-39 has been reported to be 1,817 feet (DOE 1986), 2,020 feet (DOE 1985), and 2,190 feet (Appendix D). P-39 connects to P-38 (10-inch vitrified-clay pipe) southeast of Building 782 and to P-40 (6-inch fiberglass pipe) at a manhole northeast of Building 990.

Wastes Transferred. P-39 transferred waste from Buildings 703, 774, 776, 777, 778, and 779. This waste stream included the following:

- Acids: HNO_3, HCl, H_2SO_4, H_3PO_4, HF, H_2CrO_4, and oxalic;
- Bases: NH_4OH, NaOH, KOH, and CaOH;

- Solvents: Alcohols, CCl_4, TCA, TCE, PCE, acetone, chloroform, xylenes, toluene, freon, and kerosene;

- Radioactive Materials: Various isotopes of Pu, Am, U, and tritium;

- Metals: Hg, Be, Ni, Cd, Cr, Au, Pb, Fe, Ag, Pt, Ti, Ta, Zn, Cu, Sn, W, Mn, and Mg; and

- Others: Chlorides and possible lubricating oil.

Site Walk Information. Three manholes associated with P-39 were investigated in March 1994. The first manhole, located southeast of Pond 207-B, is approximately 6 feet by 6 feet by 10 feet deep. The manhole contained an open-top 10-inch vitrified-clay pipe at approximately 10 feet below ground surface entering from the west and exiting to the southeast. The second manhole, located northeast of Building 990, is approximately 6 feet by 6 feet by 10 feet deep. The manhole contained an open-top 10-inch vitrified-clay pipe at approximately 10 feet below ground surface entering from the northwest and exiting to the southeast. The P-39/P-40 intersection was not visible in this manhole. The third manhole, located south of Building 995, was observed to be the P-39 and Building 995 outfall. The manhole was filled with water and partially covered with a structure. The outfall is a concrete weir with a flow rate of approximately 75 to 100 gpm (Jacobs 1994).

Historical Releases. Releases from P-39 have been reported near the east end of the pipeline and outfall (DOE 1986; DOE 1988).

3.40 OPWL P-40

Location. Line P-40 tracks from northeast of Building 990 to Pond B-2 (EG&G 1990; DOE 1988) (Plates 8 and 9). P-40 originates at the intersection with P-39 (manhole northeast of Building 990) and continues east tracking north of Building 995 and then to Pond B-2. The pipeline discharged into a 55-gallon sediment collection drum at the edge of Pond B-2. Overflow from the drum discharged into Pond B-2. Approximately 75 to 80 percent of the pipeline was constructed aboveground. The aboveground piping started east of the security zone fence and continued to Pond B-2.

Status. P-40 was installed in 1972 (DOE 1986), and abandoned in 1982 (DOE 1986). The western portion of P-40 is assumed to have been abandoned in place. Most of the aboveground piping has been removed; although, in March 1994, a 200-foot section was observed north of Building 995, and a 50-foot section was observed east of Building 995.

Physical Description. P-40 consists of 6-inch-diameter fiberglass pipe (DOE 1986; EG&G 1990; DOE 1988). Total length has been reported to be 1,617 feet (DOE 1985). P-40 connects to Line P-39 (6-inch vitrified-clay pipe) at the manhole northeast of Building 990 (EG&G 1990; DOE 1988).

Wastes Transferred. P-40 transferred the following process waste from Buildings 703, 774, 776, 777, 778, and 779:

- Acids: HNO_3, HCl, H_2SO_4, H_3PO_4, HF, H_2CrO_4, and oxalic;
- Bases: NH_4OH, NaOH, KOH, and CaOH;

- Solvents: Alcohols, CCl_4, TCA, TCE, PCE, acetone, chloroform, xylenes, toluene, freon, and kerosene;

- Radioactive Materials: Various isotopes of Pu, Am, U, and tritium;

- Metals: Hg, Be, Ni, Cd, Cr, Au, Pb, Fe, Ag, Pt, Ti, Ta, Zn, Cu, Sn, W, Mn, and Mg; and

- Others: Chlorides and possibly lubricating oil.

Site Walk Information. One manhole that is associated with P-40 was investigated in March 1994. The manhole located northeast of Building 990 is 6 feet by 6 feet by 10 feet deep. The manhole contained an open-top 10-inch vitrified-clay pipe at approximately 10 feet below ground surface entering from the northwest and exiting to the southeast. The P-39/P-40 intersection was not visible in this manhole.

Historical Releases. No releases have been reported from P-40 (DOE 1986), and a small leak was reported in the portion of the pipeline under the perimeter road to Pond B-2 (Rockwell 1976). The leak under the perimeter road was a result of cable-laying activities in the area, and the damaged line was replaced. The exact date of the line repair is not known. In addition, the entire pipeline was identified on a location map as an area of reported release (DOE 1988).

According to Neil Holsteen (EG&G 1994b), a 55-gallon open-top settling drum that was part of P-40 was found near Pond B-2 during construction activities in May 1993. Soil sample analysis indicated radiological contamination around the drum. The drum itself was reportedly not sampled. The drum and associated piping were removed, bagged, and stored in a radiological controlled area (RCA) near Pond B-4 at that time. In January 1994, a site walk identified that construction activities did occur recently to the B-1 Pond dam. Soil disturbance did occur about 50 feet north of the dam. Rip rap was observed on the northeast side of the B-1 Pond dam. An area approximately 6 feet by 6 feet near the edge of the B-2 Pond, where the drum was reportedly removed, is currently posted as an RCA with fence posts and rope. The disturbed soil areas that had not been covered with rip rap had been covered with a netting to prevent erosion. By the appearance of the disturbed areas, approximately 50 to 75 feet of underground piping was removed along with the drum.

3.41 OPWL P-41

Location. P-41 is located from Building 730 to west of and beneath Building 779 (Plates 3 and 4). The line originates at Building 730 and tracks east parallel to Line P-37, turns southeast and then south near the northwest corner of Building 779. At the approximate midpoint of Building 779, P-41 turns and runs east to Building 779 (DOE 1988). The original alignment of P-41 is from Building 730 tracking east to a pipeline T located at N-37717, E-20982. One direction of the pipeline T is to the north and the other to the east. The north tracking pipeline (P-41.1) continues to N-37797, E-20982, turns east and tracks to the large valve vault north of T-29 at location N-37797, E-21069. The east tracking pipeline continues to the valve vault southwest of T-29, turns southeast and tracks to an elbow located beneath Building 779 at N-37524, E-21247, and then turns east terminating at Solar Pond 207-B.

Status. The original P-41 pipeline was installed in 1957 (DOE 1986; Rockwell 1976). P-41 was abandoned in 1982 (DOE 1986). According to Drawing 14602-1, the section of pipeline from the northwest corner of Building 779 N-37665, E-21101, southeast and east to the manhole east of Building 782 N-37534, E-21497, was removed in 1965 when Building 779 was constructed. A new section of pipeline was installed to service the new Building 779. The pipeline exited Building 779 at N-37554, E-21105, tracked west to an elbow turning north at N-37554, E-21101, and continued north connecting to the original P-41 pipeline near the northwest corner of Building 779 (N-37665, E-21101). The section of pipeline (P-41.1) from N-37717, E-20982, north to N-37797, E-20988 and east to N-37797, E-21069, was abandoned in 1969 when Building 703 was constructed (Drawing 14267-9). It is not known if P-41.1 was removed.

Physical Description. P-41 consists of a 3-inch vitrified-clay pipe (DOE 1986), 2- and 3-inch vitrified-clay pipe, black-iron pipe, and stainless-steel pipe (Appendix D), 3-inch stainless-steel pipe (Rockwell 1976), and 3-inch vitrified-clay and cast-iron pipe (EG&G 1990; DOE 1988).

The total length has been reported as 1,537 feet (DOE 1986), 2,120 feet (Appendix D), with an outside length of 494 feet (DOE 1985), and 485 feet (EG&G 1990). Line P-41 connects to P-43 (3-inch steel pipe) at the valve vault located southwest of T-29, tanks T-9 and T-10 at Building 730 (DOE 1988), and tanks T-19, T-20, and T-38 at Building 779 (DOE 1988). P-41.1 consisted of a 3-inch black-iron pipe (Drawing 14267-9). Total length was reported as 100 feet (Drawing 14267-9). P-41.1 connected to P-46 (3-inch steel pipe) at valve vault north of T-29.

Wastes Transferred. P-41 and P-41.1 transferred waste from Buildings 776, 777, 778, and 779 (EG&G 1990; DOE 1988). These wastes included the following:

- Acids: HNO_3, HCl, H_2SO_4, H_3PO_4, HF, H_2CrO_4, and oxalic;
- Bases: NH_4OH, NaOH, KOH, and CaOH;
- Solvents: Alcohols, CCl_4, TCA, TCE, PCE, acetone, chloroform, xylenes, toluene, freon, and kerosene;
- Radioactive Materials: Various isotopes of Pu, Am, possibly U, and tritium;
- Metals: Be, Ni, Cd, Cr, Au, Pb, Fe, Ag, Pt, Ti, Ta, Zn, Cu, Sn, W, Mn, and Mg; and
- Others: Possibly lubricating oil.

Site Walk Information. Two valve vaults associated with P-41 and P-41.1 were investigated in April 1994. The valve vault located southwest of T-29 was covered with soil and was not investigated. The other, the large valve vault located north of T-29, is approximately 10 feet by 20 feet with a depth of approximately 7 feet. Two pipes (P-27/P-28 and P-29) run from north to south, and three pipes (P-35, P-46, and P-58) run from east to west. The depth to the pipes is approximately 5 feet with approximately 1 foot of water in the bottom of the vault.

Historical Releases. The pipeline west of Building 779 has been identified on a location map as an area of reported release (DOE 1988).

3.42 OPWL P-42

Location. P-42 is located west of (EG&G 1990; DOE 1988) and beneath (DOE 1988) Building 779 (Plates 3 and 6). P-42 originates in Building 779 at tanks T-19, T-20, and T-38. P-42 exits the west side at approximately the midpoint of Building 779. P-42 tracks west to an elbow, turns north to another elbow, turns northwest and terminates at the valve vault located southwest of T-29. P-42 parallels P-41 from the exit location of Building 779 to the valve vault southwest of T-29. The section of P-42 from the valve vault southwest of T-29 (N-37710, E-21053) southeast to the northwest corner of Building 779 (N-37665, E-21101) was a portion of the original P-37 pipeline.

Status. Sections of P-42 were installed in 1957 (DOE 1986; Rockwell 1976) and also in 1965. P-42 was abandoned in 1982 (DOE 1986). It has been reported that P-42 was decontaminated, removed, and replaced with inspectable pipe (DOE 1986), and abandoned in place (Appendix D; DOE 1985).

Physical Description. P-42 consisted of 3-inch cast-iron pipe (DOE 1986), or 3-inch stainless-steel pipe (Appendix D; Rockwell 1976; EG&G 1990; DOE 1988). Total length has been reported as 213 feet (DOE 1986), 280 feet (Appendix D), and 164 feet (Rockwell 1976), with an outside length of 204 feet (DOE 1985), and approximately 188 feet (EG&G 1990). Line P-42 connects to P-37 (3-inch steel pipe) at the valve vault located southwest of T-29, and to tanks T-19, T-20, and T-38 at Building 779 (DOE 1988).

Wastes Transferred. P-42 transferred waste from Building 779 (EG&G 1990; DOE 1988). This waste stream included the following:

- Acids: HNO_3, HCl, H_2SO_4, H_3PO_4, HF, H_2CrO_4, and oxalic;

- <u>Bases:</u> NH_4OH, NaOH, KOH, and CaOH;

- <u>Solvents:</u> Alcohols, CCl_4, TCA, TCE, PCE, acetone, chloroform, xylenes, toluene, freon, and kerosene;

- <u>Radioactive Materials:</u> Primarily Pu and Am with a slight possibility of U-238 (no tritium);

- <u>Metals:</u> Be, Ni, Cd, Cr, Au, Pb, Fe, Ag, Pt, Ti, Ta, Zn, Cu, Sn, W, Mn, and Mg; and

- <u>Others:</u> Possibly lubricating oil.

<u>Site Walk Information</u>. One valve vault that is associated with P-42 was investigated in April 1994. The valve vault located southwest of T-29 was covered with soil and could not be opened.

<u>Historical Releases</u>. Reports indicate a release from P-42 at the intersection with P-37. In addition, the pipeline outside Building 779 was identified on a location map as an area of reported release. The pipe from Building 779 to T-29 valve pit was tested. ILDS reported that all of the valves on the south side of T-29 were leaking. Test probing for nitrous oxide revealed no line leaks (Beck 1971g).

3.43 OPWL P-43

Location. P-43 is located immediately west of storage tank T-29 (Plate 3). P-43 runs in a general south to north direction. P-43 originates at the intersection of P-41 and tracks north to an elbow, turns northeast and tracks to an elbow, turns north and tracks to another elbow, turns east and terminates at the large valve vault located north of T-29. P-43 was constructed to replace the P-41.1 pipeline that was abandoned when Building 703 was constructed in 1969 (Drawing 14267-9). The line is identified as a laundry drain on Drawing 14267-9.

Status. P-43 was installed in 1969 (Drawing 14267-9) and abandoned in 1982 (Appendix D; DOE 1986; DOE 1985).

Physical Description. P-43 consisted of a 3-inch steel pipe (Appendix D; DOE 1986; EG&G 1990; DOE 1988). The total length has been reported as 103 feet (DOE 1986), 90 feet (DOE 1985), and 105 feet (Appendix D), with an outside length of approximately 100 feet (EG&G 1990). Line P-43 connects to P-41 (3-inch vitrified-clay pipe), P-35 (3-inch steel pipe), P-27/P-28 (3-inch stainless-steel pipe), and P-46 (3-inch steel pipe) at the large valve vault located north of T-29.

Wastes Transferred. P-43 transferred the following waste from Buildings 776, 777, 778, and 779 (EG&G 1990; DOE 1988):

- Acids: HNO_3, HCl, H_2SO_4, H_3PO_4, HF, H_2CrO_4, and oxalic;
- Bases: NH_4OH, NaOH, KOH, and CaOH;

- Solvents: Alcohols, CCl_4, TCA, TCE, PCE, acetone, chloroform, xylenes, toluene, freon, and kerosene;
- Radioactive Materials: Various isotopes of Pu, Am, possibly U, and tritium;
- Metals: Be, Ni, Cd, Cr, Au, Pb, Fe, Ag, Pt, Ti, Ta, Zn, Cu, Sn, W, Mn, and Mg; and
- Others: Possibly lubricating oil and laundry detergent.

Site Walk Information. Two valve vaults that are associated with P-43 were targeted for investigation in April 1994. The large valve vault located north of T-29 is approximately 10 feet by 20 feet with a depth of approximately 7 feet. Two pipes (P-27/P-28 and P-29) run from north to south, and three pipes (P-35, P-46, and P-58) run from east to west. The depth to the pipes is approximately 5 feet with approximately 1 foot of water in the bottom of the vault. The valve vault located southwest of T-29 was covered with soil and was not investigated.

Historical Releases. Reports indicate releases from P-43 at both valve vaults mentioned above. In addition, the entire pipeline has been identified on a location map as an area of reported release (DOE 1988).

3.44 OPWL P-44

Location. P-44 is located immediately west of storage tank T-29 (Plate 3). P-44 runs parallel to laundry drain P-43. P-44 originates at the intersection of P-44 and P-58 at the large valve vault located north of T-29, tracks west to an elbow, turns south and tracks to an elbow, turns southwest and tracks to another elbow, turns south and terminates at the intersection with P-37.

Status. According to Drawing 14267-9, P-44 was installed in 1969 replacing process waste line P-59 (3-inch black-iron pipe). P-44 was abandoned in 1982 (Appendix D; DOE 1986; DOE 1985).

Physical Description. P-44 consists of 3-inch steel pipe (DOE 1986). Its total length has been reported as 92 feet (DOE 1986), 70 feet, and 75 feet (Appendix D), and 135 feet (EG&G 1990). P-44 connects to P-37 (3-inch steel pipe), P-25 (3-inch black-iron pipe), P-58 (3-inch black-iron pipe), and P-29 (4-inch cast-iron pipe).

Wastes Transferred. P-44 transferred process waste from Buildings 123, 441, 444, 559, 561, 707, 865, 881, 883, and 889 (EG&G 1990; DOE 1988). This waste stream included the following:

- Acids: HNO_3, HF, H_2SO_4, HCl, $C_2H_4O_2$, $HClO_4$, H_3PO_4, H_2CrO_4, oxalic, and cyanic;
- Bases: NH_4OH, NaOH, KOH, NH_4OH, and CaOH;
- Solvents: Acetone, alcohols, cyclohexane, toluene, xylenes, triisooctomine, ether, TCA, TCE, PCE, freon, CCl_4, chloroform, chloroethane, and paint solvents (trade names PASO, PESO);

- Radioactive Materials: Various isotopes of Pu, Am, U, Cm, and possibly Np-237;

- Metals: Ag, Au, Ca, Cr, Ta, Li, Ni, Cd, Pt, Pb, Ti, Zn, Cu, Sn, W, Fe, Hg, Mo, Mn, and Be (trace amounts); and

- Others: Ammonium thiocyanate, ethylene glycol, possibly PCBs, fluoride, chloride, lubricating oil, cutting oil, lathe coolant (oil and CCl_4), hydraulic oil, Oakite (cleaning solution), personnel decontamination water, bleach, soap, blood, and hydrogen peroxide.

Site Walk Information. Two valve vaults that are associated with P-43 were targeted for investigation in April 1994. The large valve vault located north of T-29 is approximately 10 feet by 20 feet with a depth of approximately 7 feet. Two pipes (P-27/P-28 and P-29) run from north to south, and three pipes (P-35, P-46, and P-58) run from east to west. The depth to the pipes is approximately 5 feet with approximately 1 foot of water in the bottom of the vault. The valve vault located southwest of T-29 was covered with soil and was not investigated.

Historical Releases. Reports indicate releases from P-44 at both valve vaults (DOE 1986). In addition, the pipeline east of Building 703 is identified on a location map as an area of reported release (DOE 1988).

3.45 OPWL P-45

Location. P-45 is located south of T-29 (Plate 3). P-45 originates at the southeast corner of Building 703, continues around the southerly and easterly edges of storage tank T-29, and terminates at a manhole located northeast of T-29 (EG&G 1990; DOE 1988).

Status. P-45 was installed in 1966 (Drawing 15507-5), and the date of abandonment is unknown. One report indicates that Line P-45 was temporarily in use (as of 1985) and soon to be abandoned (DOE 1985).

Physical Description. P-45 consists of a 6-inch vitrified-clay pipe (EG&G 1990; DOE 1988). The total length has been reported as 125 feet (DOE 1985), and 130 feet (EG&G 1990). P-45 connects to P-38 (10-inch vitrified-clay pipe) at the manhole located northeast of T-29 (EG&G 1990; DOE 1988).

Wastes Transferred. P-45 transferred waste from Building 703 (EG&G 1990; DOE 1988).

Historical Releases. Releases from P-45 have been reported along the west end of the pipeline (DOE 1988).

3.46 OPWL P-46

Location. P-46 is located north of storage tank T-29 (Plate 3). P-46 parallels process waste line P-35. P-46 originates at the large valve vault north of T-29, tracks east to a valve vault located northeast of T-29, and continues east to Solar Evaporation Pond 207-C. P-46 also has a spur associated with it tracking from the valve vault northeast of T-29 south to the manhole located northeast of T-29. Drawing 3763-207, drawn in June 1956, indicates that this line as well as the parallel line P-35 are sloped for gravity flow toward Pond 207-C and to the manhole northeast of T-29. Because Solar Pond 207-C was not installed until 1970, line P-46 most likely carried process waste to Solar Pond 2, which was present at the time, and was located approximately coincident with the west half of current Solar Pond 207-C.

Status. The date of P-46 installation and abandonment is unknown, but P-46 may have been installed in 1952 and abandoned in 1982.

Physical Description. P-46 consists of a 3-inch steel pipe (Appendix D; EG&G 1990; DOE 1988). Its total length has been reported as 135 feet (DOE 1986), 140 feet (Appendix D), and 142 feet (EG&G 1990). P-46 connects to P-25 (3-inch steel pipe), P-27/P-28 (3-inch stainless-steel pipe), and P-38 (10-inch vitrified-clay pipe) at the manhole located northeast of storage tank T-29.

Wastes Transferred. P-46 transferred the following waste from Buildings 774 and 771.

- Acids: HNO_3, HCl, H_2SO_4, H_3PO_4, HF, and $C_2H_4O_2$;

- Bases: NH_4OH, NaOH, KOH, MgOH, and CaOH;

- Solvents: Cyclohexane, chloroform, xylene, tri-noctyl phosphine-oxide, PCE, TCA, and TCE;

- Radioactive Materials: Various isotopes of Pu, Am, U, and possibly tritium;

- Metals: Pb, Hg, Ni, Cr, Ti, Ce, Ta, Cu, and Fe; and

- Others: Chlorides, No. 2 and No. 6 fuel oil, lubricating oil, slight possibility of PCBs. Photo lab wastes included sodium sulfide, potassium sulfide, sodium sulfate, sodium acetate, ammonium thiocyanate, alum, and Photo-Flo™.

Site Walk Information. Two valve vaults and one manhole are associated with P-35. The large valve vault located north of T-29 is approximately 10 feet by 20 feet with a depth of approximately 7 feet. Two pipes (P-27/P-28 and P-29) run from north to south, and three pipes (P-35, P-46, and P-58) run from east to west. The depth to the pipes is approximately 5 feet with approximately 1 foot of water in the bottom of the vault. The valve vault located northeast of T-29 is approximately 10 feet by 10 feet with a depth of approximately 8 feet. Two pipes (P-35 and P-46) run west to east, and two pipes (P-35 and P-46) exit the vault to the south. Approximately 6 inches of water is in the bottom of the vault. The manhole located to the northeast of T-29 is approximately 4 feet by 4 feet with an approximate depth of 8 to 10 feet. Two 4-inch pipes (P-35 and P-40) approximately 5 feet from the bottom of the manhole enter from the north, and one 10-inch open-top vitrified-clay pipe (P-61) runs from west to east at the bottom of the manhole. The two 4-inch pipes entering from the north appear to dump into the manhole, and the 10-inch pipe directs the liquid out of the manhole.

Historical Releases. Reports indicate no releases from P-46 (DOE 1986); however, the large valve vault located north of T-29 has been identified on a location map as an area of release (DOE 1988).

3.47 OPWL P-47

Location. Line P-47 exits Evaporation Pond 207-C near the southeast corner and turns south terminating at the valve vault located immediately west of Pond 207-A (Plate 4).

Status. The exact date of P-47 construction and abandonment is unknown. The utility drawing indicates that P-47 is a reverse osmosis brine pipe, not a process waste line. One report indicates that P-47 is currently in use (DOE 1985). This line will be addressed as part of OU4, the Solar Ponds site characterization and remediation activities.

Physical Description. P-47 consists of a 3-inch cement-asbestos pipe (EG&G 1990; DOE 1988). Its total length has been reported as 125 feet (DOE 1985) and 135 feet (EG&G 1990). Line P-47 connects with P-37 (3-inch steel and/or stainless steel) near the valve vault west of Pond 207-A (EG&G 1990; DOE 1988). P-47 transfers wastewater from Pond 207-C to P-37. The most likely source of the waste is Building 774. Waste includes the following:

- Acids: HNO_3, H_2SO_4, and HF;
- Bases: NaOH and KOH;
- Solvents: Small amounts of various solvents;
- Radioactive Materials: Various isotopes of Pu, Am, and U;
- Metals: Hg, Ni, Cr, Ta, and Fe; and
- Others: Chlorides, various oils and grease.

Site Walk Information. One valve vault associated with P-47 was investigated April 1994. The valve vault located west of Solar Pond 207-A is approximately 4 feet by 4 feet with a depth of approximately 5 feet. The valve vault contained four pipes (P-36 and P-37). Two pipelines run from west to east continuing to the solar pond, and two pipelines exit the south side of the vault.

One of the pipelines exiting the south side of the vault was cut and blanked. The visual inspection of the valve vault does not indicate that P-47 connected to P-37 at this location.

Historical Releases. Reports indicate no releases from P-47 along the pipeline (DOE 1985); however, the valve vault west of Pond 207-A has been identified on a location map as an area of reported release.

3.48 OPWL P-48

Location. The existence of Line P-48 is questionable. The pipeline is shown on the Site Utility Plan drawing (15501-014-M) as process waste, and is shown on the Work Plan drawing as "?" underneath Building 788. If the line did exist, it ran from Building 788 south to P-36 (Plate 4).

Status. It is unknown when Line P-48 may have been installed or when the line was abandoned. P-48 was identified as "to be abandoned" when the system is upgraded to an inspectable system in the future (DOE 1985). This line will be addressed as part of OU4, the Solar Ponds site characterization and remediation activities.

Physical Description. The pipe has been identified as being constructed of cast iron (Wright Water Engineers 1994). The diameter of the pipe is unknown and is reported to have been approximately 193 feet (DOE 1986) in length, with an outside length of approximately 65 feet (EG&G 1990). Line P-48 connected to P-36 (3-inch stainless-steel) west of the valve vault west of Pond 207-A (EG&G 1990; DOE 1988).

Wastes Transported. The most probable source of waste transported in Line P-48 was from Building 774. Waste includes the following:

- Acids: HNO_3, H_2SO_4, and HF;
- Bases: NaOH and KOH;
- Solvents: Small amounts of various solvents;
- Radioactive Materials: Various isotopes of Pu, Am, and U;
- Metals: Hg, Ni, Cr, Ta, and Fe; and
- Others: Chlorides, various oils and grease.

Historical Releases. No known releases have occurred along the pipeline (DOE 1985); however, the valve vault west of Pond 207-A has been identified on a location map as an area of reported release (DOE 1988).

3.49 OPWL P-49

Location. Line P-49 exists aboveground between Ponds 207-C and 207-A (Drawing 19379-4; EG&G 1990; DOE 1988) (Plate 4).

Status. The date of installation of P-49 is unknown. The line is identified as "to be abandoned" (DOE 1985). It is unclear if a portion of P-49 was removed for construction of Building 788A (EG&G 1990). This line will be addressed as part of the OU4, Solar Ponds, site characterization and remediation activities.

Physical Description. P-49 consists of an 8-inch cast-iron pipe that can presumably be pumped in either direction, based on the presence of wire screens located on both ends of the pipe (Wright Water Engineers 1994). The total length has been reported as 85 feet (DOE 1985), with an outside length of approximately 60 feet (EG&G 1990) and 85 feet (DOE 1988). P-49 does not connect to any other pipelines (EG&G 1990; DOE 1988).

Wastes Transferred. P-49 transferred process waste between Ponds 207-C and 207-A (EG&G 1990; DOE 1988). The most probable source of the waste contained in the ponds is from Building 774 (EG&G 1990; DOE 1988). This waste includes the following:

- Acids: HNO_3, H_2SO_4, and HF;
- Bases: NaOH and KOH;
- Solvents: Small amounts of various solvents;
- Radioactive Materials: Various isotopes of Pu, Am, and U;
- Metals: Hg, Ni, Cr, Ta, and Fe; and
- Others: Chlorides and various oils and grease.

Historical Releases. It is not known whether any releases have occurred along P-49.

3.50 OPWL P-50

Location. P-50 is an aboveground process waste line that runs east-west between the northern portion of Ponds 207-A and 207-B (Drawing 6393-207B; EG&G 1990; DOE 1988) (Plate 4). P-50 is a pumped line that can pump in either direction. This assumption is based on the fact that notes on the drawing indicate that the pump location can be changed.

Status. The date of installation is unknown, and the pump has been reported to be abandoned when the system is upgraded to an inspectable system in the future (DOE 1985). This will be addressed as part of OU4, the Solar Ponds site characterization and remediation activities.

Physical Description. P-50 consists of 8-inch-diameter cast-iron pipe (Appendix D; EG&G 1990; DOE 1988). Its total length has been reported as 105 feet (DOE 1985) and 85 feet (Appendix D), with an outside length of approximately 55 feet (EG&G 1990). Line P-50 does not connect to any other process waste lines in the area (EG&G 1990; DOE 1988).

Wastes Transferred. P-50 transferred process waste between Ponds 207-A and 207-B. The most likely source of waste for Line P-50 was Building 774 (EG&G 1990; DOE 1988). This waste includes the following:

- Acids: HNO_3, H_2SO_4, and HF;
- Bases: NaOH and KOH;
- Solvents: Small amounts of various solvents;
- Radioactive Materials: Various isotopes of Pu, Am, and U;
- Metals: Hg, Ni, Cr, Ta, and Fe; and
- Others: Chlorides, various oils and grease.

Historical Releases. No releases are known to have occurred along P-50 (DOE 1985).

3.51 OPWL P-51

Location. Line P-51 is located beneath the western end of Building 778 (Plate 6).

Status. P-51 was installed in 1957 (Appendix D) and abandoned in 1978 (Appendix D). It has been reported that the sections of P-51 above the floor slab were removed and the drains and wall penetrations plugged with expansive cement (Appendix D). The remaining under-slab pipeline was abandoned in place (Appendix D).

Physical Description. P-51 consisted of 4-inch and 6-inch black-iron pipe (Appendix D). The total length has been reported as 170 feet (Appendix D) with an outside length of 0 feet (DOE 1988). P-51 connects to T-18 in Building 778 (DOE 1988).

Wastes Transferred. P-51 transferred Building 778 laundry waste (DOE 1988). Waste included laundry water with detergent, possibly containing Pu, Am, and U.

Historical Releases. No historical releases from P-51 have been reported (Appendix D).

3.52 OPWL P-52

Location. Line P-52 is located south of and beneath Building 443 (DOE 1988) (Plate 12). It is unclear why a process waste line would be located in Building 443, which is a steam plant. P-52 does not connect to the process waste transfer system (DOE 1988).

Status. The pipeline is reported to have been plugged and abandoned in place (Appendix D), decontaminated and abandoned in place, or removed after August 10, 1978 (Appendix D).

Physical Description. P-52 consists of a 4-inch pipe (Appendix D). The total length has been reported as 280 feet (Appendix D), with an outside length of approximately 15 feet (Appendix D) and 42 feet (DOE 1988).

Wastes Transferred. P-52 transferred waste from Building 443 to an unknown location (DOE 1988). This waste included H_2SO_4 and NaOH only.

Historical Releases. No historical releases from P-52 have been reported (Appendix D).

3.53 OPWL P-53

Location. Line P-53 is located between Buildings 881 and 887 (Plate 15). There is inconsistency between Drawing F-5 of the Work Plan and Drawing 25609-X08 concerning the precise location of line P-53. Drawing 25609-X08 (Rockwell 1976), drawn May 1976 and issued June 1976, indicates that P-53 enters the north end of Building 887 at a point 8.5 feet from the east end of the building. Drawing F-5 of the Work Plan shows P-8 entering at a point further west.

Status. It has been reported that P-53 was installed in 1952 (Rockwell 1976) and abandoned under authorization No. 365556 in 1976 (Rockwell 1976).

Physical Description. P-53 consists of a 2-inch stainless-steel pipe (Rockwell 1976; EG&G 1990; DOE 1988). Its total length has been reported as 78 feet (Rockwell 1976) with an outside length of approximately 65 feet (EG&G 1990). P-53 connects to T-24 and T-32 in Building 887 (DOE 1988).

Wastes Transferred. P-53 transferred waste from Building 881 (EG&G 1990; DOE 1988) and is labeled a nitrate drain. This waste included the following:

- Acids: HNO_3, H_3PO_4, HF, and H_2SO_4;
- Bases: NaOH and KOH;
- Solvents: CCl_4, TCA, TCE, and freon;
- Radioactive Materials: U, Pu, Am (no tritium), and possibly Np-237;
- Metals: Hg, Cr, Ni, Mo, Mn, and Fe;
- Others: Possible lubricating oil, grinding oil, very slight chance of PCBs.

Historical Releases. The entire pipeline has been identified on a location map as an area of reported release (DOE 1988).

3.54 OPWL P-54

Location. Line P-54 is located south of (EG&G 1990; DOE 1988) and beneath (DOE 1988) Building 881 to Building 887 (Plate 15). The layout shown on Drawing F-5 of the Work Plan is consistent with the layout shown on Drawing 25609-X08 (Rockwell 1976), drawn May 1976 and issued June 1976 for Line P-54. P-54 exits the southwest corner of the tank vault (Building 887) and tracks north to an elbow, turns west and tracks to an elbow, turns north and tracks to Building 881.

Status. P-54 was installed in 1952 (Rockwell 1976). The southern portion of the pipeline, from N-35090, E-20707 to N-35138, E-20707, was abandoned and removed in 1976 according to authorization No. 365556 (Rockwell 1976). Also in 1976, the elbow at location N-35138, E-20692 was removed, and a diagonal pipeline from N-35138, E-20697 to N-35142, E-20692, was installed according to authorization No. 365556 (Rockwell 1976). The realignment of P-54 is double contained and is associated with the new transfer system according to authorization No. 365556 (Rockwell 1976).

Physical Description. The original P-54 pipeline consisted of 3-inch stainless-steel pipe (Rockwell 1976; EG&G 1990; DOE 1988). In 1976, the pipeline was double contained according to authorization No. 365556 (Rockwell 1976) by inserting a 2-1/2-inch flexible PVC tubing into the existing 3-inch stainless- steel pipe. According to authorization No. 365556, the realignment of the elbow to a diagonal pipeline is a 4-inch stainless-steel pipe (Drawing 25609-13). Total length has been reported as 140 feet (Rockwell 1976) with an outside length of approximately 138 feet (EG&G 1990). P-54 connects to P-6 (3-inch steel pipe) at Building 881 (DOE 1988) and to T-24 and T-32 in Building 887 (DOE 1988). P-54 has an assumed average depth of 10 feet (deeper closer to Building 881 and more shallow toward Building 887).

Wastes Transferred. P-54 receives waste from Building 881 (EG&G 1990). This waste stream included the following:

- Acids: HNO_3, H_3PO_4, HF, and H_2SO_4;
- Bases: NaOH and KOH;
- Solvents: CCl_4, TCA, TCE, and freon;
- Radioactive Materials: U, Pu, Am (no tritium), and possibly Np-237;
- Metals: Hg, Cr, Ni, Mo, Mn, and Fe; and
- Others: Possibly lubricating oil, grinding oil, very slight chance of PCBs.

Historical Releases. The entire pipeline has been identified on a location map as an area of reported release (DOE 1988). According to Maness (1971a), ILDS tested a 3-inch stainless-steel pipe that originated from Building 887 northward 100 feet to Building 881. During testing, apparently there was no leak in the line between the pumping station in Building 887 and the Building 883 valve pit (Maness 1971j).

3.55 OPWL P-55

Location. P-55 is located between Buildings 881 and 887 (EG&G 1990; DOE 1988) (Plate 15). P-55 originates in Building 881 and exits the south side tracking south to an elbow, turns west, and terminates at Building 887. The average depth for this line is 4 feet and it is gravity flow.

Status. P-55 was installed in 1952 (Rockwell 1976) and was abandoned in 1976 (Drawing 25609-X08).

Physical Description. P-55 consists of a 4-inch stainless-steel pipe (Rockwell 1976; DOE 1988). Total length has been reported as 158 feet (Rockwell 1976) with an outside length of 75 feet (EG&G 1990). P-55 connects to T-24 and T-32 in Building 887 (EG&G 1990; DOE 1988).

Wastes Transferred. P-55 transferred laundry waste from Building 881. The waste stream included the following:

- Acids: HNO_3, H_3PO_4, HF, and H_2SO_4;
- Bases: NaOH and KOH;
- Solvents: CCl_4, TCA, TCE, and freon;
- Radioactive Materials: U, Pu, Am (no tritium), and possibly Np-237;
- Metals: Hg, Cr, Ni, Mo, Mn, and Fe; and
- Others: Possibly lubricating oil, grinding oil, very slight chance of PCBs.

Historical Releases. There are no reports of historical releases from P-55.

3.56 OPWL P-56

Location. Line P-56 is made up of five pipes, all of which are located in the tunnel between Buildings 771 and 774 south of 771C (Plate 3). The tunnel was constructed in 1952 and has an interior area of less than 2 feet square. It is constructed of 8-inch-thick concrete slabs.

Status. The P-56 pipelines were installed in 1983 (Drawing 1-8255-71) and were abandoned in 1990 (EG&G 1994c). P-56 may become part of the new transfer system (EG&G 1994c). Building 774 is proposing to bring P-56 back on line for Phase II activities (EG&G 1994c). Activities at the tunnel will be guided by OU8 activities.

Physical Description. P-56 consists of three 1-inch PVC pipes and two 2-inch plastic hose pipes. Total length has been reported as 167 feet (DOE 1986) each, with an outside length of 170 feet (DOE 1988). P-56 connects to P-22 (6-inch cast iron) at Buildings 771 and 774 (DOE 1988). P-56 transferred waste between Buildings 771 and 774 (EG&G 1990; DOE 1988). This waste stream included the following:

- Acids: HNO_3, HCl, H_2SO_4, H_3PO_4, HF, and $C_2H_4O_2$;
- Bases: NH_4OH, NaOH, KOH, MgOH, and CaOH;
- Solvents: Cyclohexane, chloroform, xylene, tri-noctyl phosphine-oxide, PCE, TCA, and TCE;
- Radioactive Materials: Various isotopes of Pu, Am, U, and possibly tritium;
- Metals: Pb, Hg, Ni, Cr, Ti, Ce, Ta, Cu, and Fe; and

- Others: Chlorides, No. 2 and No. 6 fuel oil, lubricating oil, slight possibility of PCBs. Photo laboratory wastes included sodium sulfide, potassium sulfide, sodium sulfate, sodium acetate, ammonium thiocyanate, alum, and Photo-Flo™.

Historical Releases. Reports indicate no historical releases from P-56 (DOE 1986) or that the pipe tunnel has been contaminated (Appendix D). In addition EG&G (1994c) reports that many releases have resulted in a highly contaminated tunnel.

3.57 OPWL P-57

The existence of Line P-57 is highly questionable. No information has been located to verify that this line or any process waste line exists south of Building 122 or west of Building 123. Interviewees have stated that process waste was physically moved by drums and dumpsters to treatment facilities rather than moved by process waste lines.

3.58 OPWL P-58

Location. Line P-58 is located south and east of Building 703 (Drawing 14267-9) (Plate 3). P-58 originated at the intersection with P-20 and P-21 located at the valve vault southwest of Building 703 (N-37728, E-20990). The pipeline tracked east to an elbow southeast of Building 703 (N-337728, E-21043), turned north and tracked to another elbow located west of the large valve vault north of storage tank T-29 (N-37796, E-21043), turned east and terminated at the large valve vault north of storage tank T-29 (N-37796, E-21074). P-58 was not identified as an OPWL in the OU9 Work Plan (DOE 1992).

Status. P-58 was installed in 1952 and abandoned in 1969 when Building 703 was constructed (Drawing 14267-9). It is unclear if the piping was removed or abandoned in place.

Physical Description. P-58 consisted of a 3-inch black-iron pipe with a total length of 90 feet (Drawing 14267-9). P-58 connected to P-20 (3-inch stainless-steel pipe) at the valve vault located southwest of Building 703, to P-21 (3-inch stainless-steel pipe) at the valve vault located southwest of Building 703, to P-29 (4-inch cast-iron pipe), P-35 (3-inch steel pipe), and P-44 (3-inch steel pipe), all at the large valve vault located north of storage tank T-29.

Wastes Transferred. P-58 transferred process waste from buildings located within areas 100, 800, 500, and 400. The waste stream included the following:

- Acids: HNO_3, HF, H_2SO_4, HCl, $C_2H_4O_2$, $HClO_4$, H_3PO_4, H_2CrO_4, oxalic, and cyanic;
- Bases: NH_4OH, NaOH, KOH, NH_4OH, and CaOH;

- Solvents: Acetone, alcohols, cyclohexane, toluene, xylenes, triisooctomine, ether, TCA, TCE, PCE, freon, CCl_4, chloroform, chloroethane, and paint solvents (trade names PASO, PESO);

- Radioactive Materials: Various isotopes of Pu, Am, U, Cm, and possibly Np-237;

- Metals: Ag, Au, Cr, Ta, Ni, Cd, Pt, Pb, Ti, Zn, Cu, Ca, Sn, W, Fe, Hg, Mo, Mn, Li, and Be (trace amounts); and

- Others: Ammonium thiocyanate, ethylene glycol, possibly PCBs, fluoride, chloride, lubricating oil, cutting oil, lathe coolant (oil and CCl_4), hydraulic oil, Oakite (cleaning solution).

Site Walk Information. Two valve vaults that are associated with P-58 were investigated in March 1994. The large valve vault located north of T-29 is approximately 10 feet by 20 feet with a depth of approximately 7 feet. Two pipes (P-27/P-28 and P-29) run from north to south, and three pipes (P-35, P-46, and P-58) run from east to west. The depth to the pipes is approximately 5 feet with approximately 1 foot of water in the bottom of the vault. The other valve vault located south west of Building 703 contained a 10-inch vitrified-clay pipe (P-20 and P-21) that exited the north and the south sides. The east and west walls of the valve vault were not visible at the time of inspection. All piping in the vault was cut at the wall and removed. The depth of the vault is approximately 10 feet, and the depth to the water in the vault is approximately 4 feet.

Historical Releases. It is not known if any releases have occurred along P-58.

3.59 OPWL P-59

Location. P-59 is located east of Building 703 (Drawing 14267-9) (Plate 3). P-59 originated at the large valve vault located north of storage tank T-29 (N-37796, E-21043). The pipeline tracked west to an elbow (37795, E-21073), turned south, and terminated at the intersection with P-37 (N-37718, E-21043). P-59 was not identified as an OPWL in the *OU9 Phase 1 RFI/RI Work Plan* (DOE 1992).

Status. P-59 was installed in 1952 and abandoned in 1969 when Building 703 was constructed (Drawing 14267-9). P-44 replaced P-59. It is not clear whether the line was removed or abandoned in place.

Physical Description. According to Drawing 14267-9, P-59 consisted of 3-inch black-iron pipe with a total length of 70 feet. Line P-59 connected to P-37 (3-inch stainless-steel/PVC/vitrified-clay pipe) (N-37718, E-21043), P-25 (3-inch black-iron pipe), P-29 (4 inch cast iron pipe), and P-46 (3-inch steel pipe).

Wastes Transferred. P-59 transferred process waste from Building 774. This waste stream included the following:

- Acids: HNO_3, H_2SO_4, and HF;
- Bases: NaOH and KOH;
- Solvents: Small amounts of various solvents;
- Radioactive Materials: Various isotopes of Pu, Am, and U;
- Metals: Fe, Cr, Hg, Ni, and Ta; and
- Others: Chlorides, small amounts of various oils and grease.

Site Walk Information. Two valve vaults that are associated with P-59 were investigated in March 1994. The large valve vault located north of T-29 is approximately 10 feet by 20 feet with a depth of approximately 7 feet. Two pipes (P-27/P-28 and P-29) run from north to south, and two pipes (P-35, P-46, and P-58) run from east to west. The depth to the pipes is approximately 5 feet with approximately 1 foot of water in the bottom of the vault. The other valve vault located southwest of Building 703 contained a 10-inch vitrified-clay pipe (P-20 and P-21) that exited the north and the south sides. The east and west walls of the valve vault were not visible at the time of inspection. All piping in the vault was cut at the wall and removed. The depth of the vault is approximately 10 feet, and the depth to the water in the vault is approximately 4 feet.

Historical Releases. It is not known if any releases have occurred along P-58.

3.60 OPWL P-60

Location. Line P-60 is located northeast of storage tank T-29 (Drawing 14267-9) (Plate 3). The original P-60 alignment originated at the small valve vault located north of storage tank T-29 and tracked east to an elbow, turned southeast and tracked to an elbow, turned east and terminated at Solar Pond 207-C. Because Solar Pond 207-C was not installed until 1970, line P-60 most likely carried process waste to Solar Pond 2, which was present at the time, and was located approximately coincident with the west half of current Solar Pond 207-C. P-60 was not identified as an OPWL in the *OU9 Phase I RFI/RI Work Plan* (DOE 1992).

Status. P-60 was installed in 1952 and removed in 1970 when Solar Pond 207-C was constructed.

Physical Description. P-60 consisted of a 4-inch black-iron or vitrified-clay pipe, with a total length of 180 feet (Drawing 14267-9). P-60 connected to P-29 (4-inch cast-iron pipe) at the valve vault located north of T-29.

Wastes Transferred. P-60 transferred treated waste from Building 774. This waste included the following:

- Acids: HNO_3, H_2SO_4, and HF;
- Bases: NaOH and KOH;
- Solvents: Small amounts of various solvents;
- Radioactive Materials: Various isotopes of Pu, Am, and U;
- Metals: Fe, Cr, Hg, Ni, and Ta; and
- Others: Chlorides and small amounts of various oils and grease.

Site Walk Information. One valve vault associated with P-60 was investigated in March 1994. The smaller valve vault north of T-29 is approximately 3 feet by 3 feet with a depth of approximately 8 feet. Two pipes (P-27/P-28 and P-29) visibly run north to south. One of the pipes connects to a pipe running up the side of T-29, and the other pipe branches into two pipelines. One of the branched pipelines exits the valve vault to the east, and the other is cut and blanked. The depths of the pipes are approximately 5 feet with approximately 4 feet of water in the vault.

Historical Releases. It is not known whether any releases have occurred along P-60.

3.61 OPWL P-61

Location. Line P-61 is located northwest of storage tank T-29 (Drawing 14267-9) (Plate 3). P-61 originated at the small valve vault located north of storage tank T-29 and tracked east terminating at the manhole located northeast of T-29. P-61 was not identified as an OPWL in the *OU9 Phase I RFI/RI Work Plan* (DOE 1992).

Status. P-61 was installed in 1952 and abandoned in 1982.

Physical Description. P-61 consists of a 4-inch vitrified-clay pipe, with a total length of 70 feet (Drawing 14267-9). P-61 connects to P-29 (4-inch cast-iron pipe) at the valve vault located north of T-29 and P-38 (10-inch PVC and vitrified clay) at the manhole located northeast of T-29.

Wastes Transferred. P-61 transferred treated waste from Building 774. This waste included the following:

- Acids: HNO_3, H_2SO_4, and HF;
- Bases: NaOH and KOH;
- Solvents: Small amounts of various solvents;
- Radioactive Materials: Various isotopes of Pu, Am, and U;
- Metals: Fe, Cr, Hg, Ni, and Ta; and
- Others: Chlorides and small amounts of various oils and grease.

Site Walk Information. One valve vault associated with P-60 was investigated in March 1994. The smaller valve vault north of T-29 is approximately 3 feet by 3 feet with a depth of approximately 8 feet. Two pipes (P-27/P-28 and P-29) visibly run north to south. One of the pipes connects to a pipe running up the side of T-29, and the other pipe branches into two pipelines. One of the branched pipelines exits the valve vault to the east, and the other is cut and blanked. The depths of the pipes are approximately 5 feet with approximately 4 feet of water in the vault.

Historical Releases.

It is not known whether any releases have occurred along P-61.

3.62 OPWL P-62

Location. P-62 is located between Buildings 559 and Building 561, and also between Buildings 561 and 528 (Plate 5). P-62 originates in Building 559 and exits the Building on the south side and tracks south inside a utility tunnel to Building 561. The pipeline is routed inside Building 561 and exits on the east side and terminates at Building 528 (Drawing 25609-1). P-62 was not identified as an OPWL in the *OU9 Phase I RFI/RI Work Plan* (DOE 1992).

Status. P-62 was installed in 1976 and abandoned in 1990. According to Bob Dikeman of Building 559, Building 559 is proposing to bring P-62 back on line for Phase II activities (Dikeman 1994).

Physical Description. P-62 consists of two pipelines: one 2.5-inch-diameter pipe and one 1.5-inch-diameter pipe. From Building 559 to Building 561 in the utility tunnel, the piping is PVC. From Building 561 east to Building 528, the piping is stainless steel. The total length is 42 feet (Drawing 25609-1). P-62 connects to Building 559 and T-7.

Wastes Transferred. P-62 transferred the following process waste from Building 559:

- Acids: HNO_3, HCl, H_2SO_4, HF, and H_2CrO_4;
- Bases: NH_4OH, NaOH, and KOH;
- Solvents: Acetone, CCl_4, chloroform, 1,1,1 TCA, TCE, and freon;
- Radioactive Materials: Primarily Pu, with lesser amounts of Am and U;
- Metals: Numerous metals used in preparation of standards, primarily Cu and Cr; and
- Others: Very slight chance of PCBs, pesticides, or herbicides.

Historical Releases. No known releases have occurred along P-62. However, Building 559 has been identified on a location map as an area of release (DOE 1988).

3.63 OPWL P-63

Location. P-63 is located west of Building 886 (Plate 14). P-63 originates inside Building 886 and exists at two locations. One pipeline exits the west side of Building 886 in the southern portion and tracks west to an elbow, turns north and tracks to a pipeline T, turns west and terminates at Building 828. The other pipeline exits the west side of Building 886 around the midpoint and tracks west to an elbow, turns south and tracks until it intersects the other pipeline at the pipeline T. P-63 was not identified as an OPWL in the *OU9 Phase I RFI/RI Work Plan* (DOE 1992).

Status. P-63 was installed in 1963. The northern portion of P-63 north of the pipeline T was abandoned in 1977. The date of P-63 abandonment is not known.

Physical Description. P-63 consisted of 2-inch and 3-inch steel pipe. Total length has been reported at 100 feet. P-63 connects to T-22 inside Building 828.

Wastes Transferred. P-63 transferred wastes from Rooms 101 and 103 in Building 886. The waste stream included the following:

- Radioactive Materials: U-235 and Pu; and
- Others: Possibly nitrates.

Historical Releases. There are no reports of historical releases from P-63.

3.64 OPWL P-64

Location. Line P-64 is located west of Building 886 (Plate 14). P-64 originates at both Buildings 828 and 886. P-64 is considered a process transfer line for Rooms 101 and 103 in Building 886. Process liquid is transferred to and from Building 886. The pipeline exits the west side of Building 886 at two locations. One location is from the southern portion and tracks west to an elbow, turns north and tracks to a pipeline T, turns west and terminates at Building 828. The other location is from the midpoint of Building 886 and tracks west to intersect the other pipeline at the T. P-64 was not identified as an OPWL in the *OU9 Phase I RFI/RI Work Plan* (DOE 1992).

Status. P-64 was installed in 1963, and the date of abandonment is not known.

Physical Description. P-64 consists of four 1-inch stainless-steel pipes inside an 8-inch Schedule 40 steel pipe and two 1-inch stainless-steel pipes inside a 6-inch Schedule 40 steel pipe. The total length has been reported as 65 feet. P-64 connects to T-21 inside Building 828.

Wastes Transferred. P-64 did not transfer process waste; it transferred process liquids for the laboratory. This process liquid consisted of Radioactive Material (U-235 and Pu).

Historical Releases. There are no reports of historical releases from P-64.

3.65 OPWL P-65

Location. Line P-65 is located northwest of Building 828 (Plate 14). P-65 originates inside the Building 828 tank vault and exits the north side tracking to an elbow, turns northwest and terminates at a sanitary sewer lift station located east of Building 865. P-65 was not identified as an OPWL in the *OU9 Phase I RFI/RI Work Plan* (DOE 1992).

Status. P-65 was installed in 1963 and abandoned in 1966.

Physical Description. P-65 consists of a 2-inch ductile-iron pipe. Total length has been reported as 80 feet. P-65 connects to T-22 inside the Building 828 tank vault.

Wastes Transferred. P-65 transferred wastes from Rooms 101 and 103 in Building 886. The waste stream included the following:

- Radioactive Materials: U-235 and Pu; and
- Others: Possible nitrates.

Historical Releases. There are no reports of historical releases from P-65.

3.66 OPWL P-66

Location. P-66 is located west of Building 886 (Plate 14). P-66 originates in Building 886 and exits the west side about the midpoint of the building. The pipeline tracks west to an elbow, turns south and terminates at Building 828. P-66 was not identified as an OPWL in the *OU9 Phase I RFI/RI Work Plan* (DOE 1992).

Status. P-66 was installed in 1977. The date of abandonment is not known.

Physical Description. P-66 consists of 2-inch stainless-steel pipe inside a 4-inch steel pipe. Total length has been reported as 50 feet. P-66 connects to T-22 inside the Building 828 tank vault.

Wastes Transferred. P-66 transferred waste from Room 103 in Building 886. The waste stream included the following:

- Radioactive Materials: U-235 and Pu; and
- Other: Possible nitrates.

Historical Releases. There are no reports of historical releases from P-66.

TABLE 3-1
Pipeline Feature Summary
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

Pipeline No.	Pipe Size (in.)	Pipe Material	Est. Avg. Depth (ft)	Total Length* (ft)	Outside Length* (ft)	Gravity or Pressure	No. of Vaults	No. of Manholes	Remarks
P-1	3 in 4	Poly in Stl	5	180/120	120/89	Pr		2	
P-2	4	CI	5	452	0	Gr		1	
P-3	4	VC	5	162	158/92	Gr		3	
P-4	4	CI	3.5	1750/1193	1773	Gr	1	2	
P-5	2, 3, 4, or 6	CI	3.5	1561	175/152	Gr		1	
P-6	3 in 10	SaSt in VC	3.5 - 10	1300/865	820/910	Pr/Gr		3	Three lampholes.
P-7	2 in 4	Poly in SS	10	440	85	Gr			Portions of line replaced with 6-inch stainless-steel pipe.
P-8	************ Pipeline Does Not Exist ************								
P-9	1.5, 3	SS, Stl	3.5 - 10	504	390/410	Pr		1	Field investigation revealed steel pipe inside open-top clay pipe.
P-10	3	SS	3.5 - 6	1190/550/560	455	Pr		3	
P-11	3 in 10	RH in VC	8 - 10	175/165	175/165	Gr		1	Original line had two manholes; one was investigated.
P-12	3 in 10	SaSt in VC	8 - 10	575	510	Gr	1		One lamphole.
P-13	3 in 4	RH in FI	8 - 10	523	523	Gr	1		
P-14	3 in 10	SaSt in VC	3	942/625	648	Gr	2		

TABLE 3-1
Pipeline Feature Summary
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

Pipeline No.	Pipe Size (in.)	Pipe Material	Est. Avg. Depth (ft)	Total Length* (ft)	Outside Length* (ft)	Gravity or Pressure	No. of Vaults	No. of Manholes	Remarks
P-15	3 in 10	SS in VC	10	878/850	785	Gr	1	3	Original line had four manholes; three were investigated.
P-16	3	PVC	10	170/165/130	110	Pr/Gr		1	
P-17	4	GL	7	1130	135/160	Gr		1	Reports identify numerous pipe diameters and materials.
P-18	************ Pipeline Does Not Exist ************								
P-19	3	SS	3.5	603/980/186	147/154	Pr		1	
P-20	3	SS	4	499/480/455	475	Gr	1	1	
P-21	3	SS	4	386/185	310	Gr	1		
P-22	6	CI	10	1205/1335/85	83	Gr		1	
P-23	10	FI or SS	3.5	395	410	Gr		1	
P-24	6	CI	10	306/290/180	295	Pr			
P-25	3	SS, CI & STL	5 - 10	562	495	Pr	1		
P-26	Two Pipes -1.5	PVC, SS	3	2750/1500	1445	Pr			
P-27	3	SS	5	185/195	125	Gr			
P-28	3	SS	5	111/115	128	Gr	2		
P-29	4	CI & SS	5	197	130	Pr	2		

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TABLE 3-1
Pipeline Feature Summary
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

Pipeline No.	Pipe Size (in.)	Pipe Material	Est. Avg. Depth (ft)	Total Length* (ft)	Outside Length* (ft)	Gravity or Pressure	No. of Vaults	No. of Manholes	Remarks
P-30	4 and 6	Stl	Unknown	667/1377	70/100	Gr			
P-31	Three Pipes - 2 One Pipe - 1	PVC	Tunnel	167	170	Pr			Reports indicate numerous pipe alterations (size and material).
P-32	4 and 6	VC/Stl/CI	Unknown	907/535	72/70/115	Gr			
P-33	3	Stl	3.5	142	140	Unknown			
P-34	3	SS/Stl	3.5	127/130	198	Pr	1		
P-35	Two Pipes - 3	SS/Stl	5	144/135	142	Gr	2	1	
P-36	3	PVC & SS	4	599/530	513	Gr	3		
P-37	3	Stl/PVC/VC	3.5	1449/1500/1055	1350	Gr	2		
P-38	10	VC	8 - 10	800/700/660	688	Gr		2	Original line was 6-inch VC; two manholes investigated.
P-39	6	VC	10	1817/2020/2190	1787	Gr		3	Original line had five manholes; three manholes investigated.
P-40	6	FI	Unknown	1617	1617	Gr		1	
P-41	2, 3	BI/VC/SS	3.5	1537/2120	494/485	Gr	1		
P-42	3	CI/SS	3.5	213/280/164	188/204	Pr	1		
P-43	3	Stl	3.5	103/90/105	100	Gr	2		

TABLE 3-1
Pipeline Feature Summary
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

Pipeline No.	Pipe Size (in.)	Pipe Material	Est. Avg. Depth (ft)	Total Length* (ft)	Outside Length* (ft)	Gravity or Pressure	No. of Vaults	No. of Manholes	Remarks
P-44	3	Stl	3.5	92/70/75/135	135	Gr	2		
P-45	6	VC	3.5	125/130	125/130	Gr		1	
P-46	3	Stl	5	135/140/142	135/140/142	Gr	2	1	
P-47	3	CA	Above	125/135	125/135	Pr	1		
P-48	Unknown	CI	Unknown	193	65	Unknown			
P-49	8	CI	Above	85	60/85	Pr			
P-50	8	CI	Above	105/85	55	Pr			
P-51	4 & 6	BI	Unknown	170		Gr			
P-52	4	Unknown		280	15/42	Gr			Not part of OPWL.
P-53	2	SS	10	78	65	Gr			
P-54	2.5 in 3	PVC in SS	9	140	138	Pr			
P-55	4	SS	5	158	75	Gr			
P-56	Three Pipes - 1 Two Pipes - 2	PVC Plas	Tunnel	167 ea	170 ea	Pr			
P-57	************ Pipeline Does Not Exist ************								
P-58	3	BI	5	90	90	Gr	2		
P-59	3	BI	5	70	70	Gr	2		
P-60	4	BI or VC	5	180	180	Gr	1		
P-61	4	VC	5	70	70	Gr	1	1	

TABLE 3-1
Pipeline Feature Summary
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

Pipeline No.	Pipe Size (in.)	Pipe Material	Est. Avg. Depth (ft)	Total Length* (ft)	Outside Length* (ft)	Gravity or Pressure	No. of Vaults	No. of Manholes	Remarks
P-62	One Pipe - 2.5 One Pipe - 1.5	PVC and SS	Unknown	42	42	Gr			
P-63	2 and 3	Stl	3	100	100	Gr	1		
P-64	Four Pipes - 1	Stl	3	65	65	Pr	1		
P-65	2	DI	3	80	80	Gr	2		
P-66	2 in 4	SS	3	50	50	Gr	1		

Avg.	=	Average	Plas	=	Plastic
BI	=	Black Iron	Poly	=	Polyethylene
CA	=	Cement-Asbestos	Pr	=	Pressure
CI	=	Cast Iron	PVC	=	Polyvinyl Chloride
DI	=	Ductile Iron	RH	=	Ribbed Hose
Est.	=	Estimated	SaSt	=	Saran-lined Steel
FI	=	Fiberglass	SS	=	Stainless Steel
ft	=	feet	Stl	=	Steel
GL	=	Pyrex Glass	Tef	=	Teflon
Gr	=	Gravity	Vc	=	Vitrified Clay
in.	=	inches			

* When conflicting data exist, all reported lengths have been provided.

4.0 ORIGINAL PROCESS WASTE LINES FIELD INVESTIGATION

This section provides the rationale and approach for the proposed field sampling effort at OU9 OPWL. The objective of the OU9 field sampling effort is to generate sufficient and adequate data to satisfy the Phase I RFI/RI objectives described in Section 4.0 of the *OU9 RFI/RI Work Plan* (DOE 1992a).

The purpose of the OPWL field investigation is to characterize the contaminant sources and surrounding environment within OU9. Therefore, the scope of the field investigation effort will include compiling a comprehensive inventory of the OPWL system and characterizing the nature and extent of contamination in soils and groundwater at OU9. In addition, the field investigation will confirm the location and current status of the pipelines associated with the OPWL.

Under this technical memorandum, the OU9 OPWL field investigation has been divided into a series of decision-making steps that will allow the field team to select an investigative approach or approaches that best fit the site-specific conditions at each pipeline yet still maintain the data quality objectives (DQOs) specified in the *OU9 RFI/RI Work Plan* (DOE 1992a). The necessary decision-making steps are listed below and further defined in Section 4.3, Field Investigation Decision Guidelines.

- Pipeline Applicability to OPWL Field Investigations;
- Pipeline Location Verification;
- Pipeline Investigation Deferral;
- Pipeline Removal from OU9;
- Pipeline Field Sampling;
- Pipeline Integrity Evaluation;

- Early Action Evaluation; and
- Stage 1 Investigation Completion.

Figure 4-1 illustrates the eight decision-making steps and lists the primary components involved with each step of the investigation. As Figure 4-1 illustrates, the ultimate goal of the OPWL investigation is to gather sufficient information about each OU9 pipeline so that a decision can be made regarding the means by which the pipeline can be investigated. However, in those cases where the pipeline cannot be investigated at this time (i.e., the pipeline is currently in use in some other capacity at RFETS) or the pipeline cannot be accessed (e.g., obstructed by a building), the characterization effort for that particular pipeline(s) will be deferred until the investigation can be completed and will be reported in a separate technical memorandum.

4.1 SAMPLING APPROACH

As described in the *OU9 RFI/RI Work Plan* (DOE 1992a), the OU9 field investigation was to be conducted in a series of three stages; the scope of each successive stage was determined from the results of the prior stage(s). Stage 1 sampling activities were designed to detect points of contamination in OU9 vadose-zone soils and to provide an assessment of the nature of contamination at these locations. Stage 2 sampling activities were designed to provide an assessment of the extent of contamination. Stage 3 activities were designed to further characterize the horizontal and lateral extent of contamination surrounding the pipelines. However, in an effort to streamline the OPWL investigation, the sampling approach proposed in this technical memorandum incorporates and, in some cases, expands the scope and sampling approach for Stage 1, 2, and 3 activities proposed in the *OU9 RFI/RI Work Plan* (DOE 1992a). The scope of the OU9 field investigation has been expanded to facilitate the collection of data required for remedial decisions such as early action, removal, or no further action. In the event that characterization activities identify potential threats to public health and the environment and they can be implemented within six months, a

Proposed Action Memorandum (PAM) may be considered. To accomplish this objective, the scope of this technical memorandum now accommodates RFI/RI Stage 1 field activities as well as Stage 2 and Stage 3 investigations.

In addition, the methods by which the steps of the technical memorandum investigation will be conducted have also been modified to allow for an expanded selection of contingency actions (i.e., investigative methods) to address potential problems associated with diverse field conditions, worker protection, and environmental safety. These contingency actions and supporting rationale are described in more detail in the following text.

As described in the *OU9 RFI/RI Work Plan* (DOE 1992a), the Stage 1 field activities were proposed to be conducted using a series of test pits. These test pits were to be used to verify pipeline locations, collect soil samples, and collect residue samples from the pipelines. However, several concerns for using test pits as the only method of investigation have been identified. Some of those concerns are the validity of the presumption that the pipelines leaked in only specific locations (e.g., structural features), worker safety considerations within open test pits, and limited data obtained regarding the extent of contamination (if any). In addition to these concerns, the following safety and logistical factors were considered:

- Test pits may be deeper than 15 feet for some pipelines, which would require workers to enter them and hand dig above the pipe. Test pits deeper than 4 feet fall under Occupational Safety and Health Administration (OSHA) requirements for shoring and confined-space entry.

- The *Plan for the Prevention of Contaminant Dispersion* (DOE 1992c) requires use of engineering controls (such as housing over the test pit) to mitigate dust dispersion at all excavations. These measures are required to protect workers at the site and the members of the RFETS public.

- Some test pit locations would not be accessible for investigation because of proximity to security fences, building foundations, utilities, etc. Roads in the Protected Area that must be kept accessible to security personnel must not be blocked by these activities.

- Relatively large quantities of soils will be excavated from the test pits and must be temporarily placed on plastic before backfilling the test pit. This would result in significant amounts of investigation-derived material that would require temporary management and backfilling.

Based on the considerations listed above, the OPWL sampling approach has been expanded to include contingency actions that allow the field team to adjust the sampling approach to address adverse field conditions and site logistical barriers that may be encountered if test pits are used exclusively. By incorporating additional investigative tools into the OPWL field investigation, a more comprehensive database may be obtained in less time and with less health risk and manpower effort than obtained with test pits alone. As such, an observational approach is proposed for the OU9 field investigation that incorporates a variety of locating and sampling methods as contingency measures to adequately address site conditions that are not conducive to the use of test pits. It should be noted, however, that test pits will still be considered as a viable locating/sampling option where field conditions are amenable. The use of the observational approach and the flexibility it provides through the use of other investigative techniques have been integrated to meet the DQOs presented in the *OU9 RFI/RI Work Plan* (DOE 1992a). These DQOs were also presented in *Technical Memorandum No. 1, Volume I - Tanks*, Appendix B (DOE 1994a).

The appropriate investigative method(s) will be selected in the field using specific approved criteria and will be based on site conditions, safety considerations, and specific RFETS requirements (e.g., plant security). Although the specific pipeline locating and sampling methods discussed in the *OU9 RFI/RI Work Plan* (DOE 1992a) are still included in the proposed observational approach for the OPWL investigation, additional proven and reliable techniques are added to a list of choices that the OU9 Manager may select from when assessing the most appropriate method(s) based on site conditions. Therefore, the sample areas formerly referred to in the *OU9 RFI/RI Work Plan* (DOE 1992a) as "test pits" will now be referred to as "test areas." To facilitate a consistent field effort using this proposed observational approach, decision trees have been prepared to guide the field team regarding the criteria to be assessed when selecting the most appropriate pipeline locating or sampling method(s). These decision trees are described in Section 4.3.

4.2 PIPELINE TEST AREAS

The objective of the use of test areas is to have them serve as a focal point of the OPWL field investigation to characterize potential pipeline contamination of surrounding soils and groundwater. As discussed in the pipeline release conceptual model (Section 2.5.2.1 of the *OU9 RFI/RI Work Plan* [DOE 1992a]), pipeline releases are most likely to occur at structural features in the pipeline. Therefore, structural features will be identified as primary test area locations. Examples of the pipeline structural features include the following:

- valves, cleanouts, manholes, and other pipeline openings;
- elbows, tees, and reducers;
- pipe and tank connections; and
- transitions in pipeline materials.

In addition to the criteria listed above, the *OU9 RFI/RI Work Plan* (DOE 1992a) specifies that known or suspected release locations identified during the data compilation activities (Section 3.0) will also be targeted as test areas. Furthermore, any "hot spots" identified after completion of the integrated OU surface radiation surveys will be targeted as test areas during the OPWL investigation. The evaluation concerning the addition of test areas in "hot spot" areas designated by the surface radiation survey results is discussed in Section 4.2.

In accordance with the pipeline conceptual release model described in the *OU9 RFI/RI Work Plan* (DOE 1992a), spacing between test areas proposed for the OPWL is not to exceed 200 feet. Test area spacing will be reduced to a maximum of 100 feet under the following conditions: (1) historical information indicates that a release occurred along a particular section of pipeline, but the exact location of the release cannot be determined from the available data; (2) poor pipeline integrity has been observed during test pit sampling activities; (3) poor pipeline integrity has been observed during a pipeline video inspection; (4) pipeline pressure testing results indicate pipeline leakage; or (5) pipelines have been removed.

Based on the criteria listed above, 163 individual test areas have been tentatively identified for the OPWL investigation. Table 4-1 lists the test-area designation, its associated pipeline(s), and coordinates. Because many of the 163 individual test areas serve as test areas for other pipelines, the total number of test-area designations for all locations on all pipelines is 309 (Table 4-1). In addition, the total number of test areas may change depending on pipeline conditions encountered during the field investigation. The locations of the test areas identified in Table 4-1 have been plotted on utility maps provided by the RFETS Utilities Department and are presented on Plates 1 through 15. These plates are contained in Volume II-B, separate from the text and appendices, Volume II-A.
OPWL field investigation sampling goals for each test area include the following:

- confirmation of pipeline location and configuration;
- evaluation of pipeline integrity;
- sample collection of surface soil;
- sample collection of pipeline trench backfill;
- sample collection of native soils located beneath pipeline trench;
- sample collection of pipeline residue (if any);
- sample collection of groundwater near pipelines (where possible); and
- field measurements of internal pipeline surface radiological dose rate.

The sample collection goals listed above will be evaluated on a case-by-case basis for each test area. For example, collection of pipeline residue will be contingent on the line's accessibility, the appropriate sample method selected for the test area (based on depth to pipeline, operational history, and pipeline composition), and groundwater conditions near the pipeline (Section 4.3.4.2). In addition, groundwater sample collection will occur only when groundwater is encountered during soil sampling activities. Pipeline integrity evaluation (e.g., pressure testing) may not always be possible because of a variety of reasons such as pipe configuration, accessibility, safety concerns, etc. Therefore, it is possible that not all of the sampling goals will be realized for every test area.

Sample collection activities for test areas will also include collection of additional subsurface-soil and groundwater samples along the pipeline trench alignment using hydraulic sampling methods (e.g., Geoprobe® and/or Hydropunch®) to determine the extent of contamination. These confirmational samples will be collected only if test areas (and/or borings from removed pipelines) are identified as contaminated by initial test area analytical results. The spread of contamination from pipeline releases is expected to be preferentially along the pipeline and/or downward into native soils underlying the bottom of the pipeline trench. Therefore, confirmational subsurface-soil and groundwater sampling will be performed along pipeline alignments and will sample both trench fill material and native soil underlying the trench. Where a contaminated test area occurs between two clean test areas, borings will be installed at 20-foot intervals along the pipeline alignment in both directions from the contaminated test area boundary. Where two or more consecutive contaminated test areas occur, borings will be installed at 20-foot intervals along the alignment between the test pits, and 20-foot intervals along the alignment outside of the contaminated test area locations. Where access is restricted, borings will be installed as closely as possible to this nominal pattern. If contamination is detected 20 feet from the contaminated test area, samples from additional 20-foot intervals will be collected until no contamination is detected. Figure 4-5 illustrates the confirmation sampling approach.

The objective of this confirmational sampling effort is to further ascertain the potential contamination of soils and groundwater from the pipelines in areas other than those targeted by test areas. Such data will further enhance the database obtained during the initial field investigations of potentially contaminated areas at OU9 so that remedial decisions such as early action or no further action may be made at the end of the combined RFI/RI Stage 1/Stage 2 field activities. Data quality of all test-area sampling will be sufficient for the RFETS preliminary remediation goals (PRGs) to be used for these remedial decisions. The objectives and approach of this confirmation sampling effort are described in Section 4.3.5. Sampling methodology and sample collection activities (including sample depths and locations) for both test-area sampling and the confirmation sampling activities described above are discussed in detail in Section 5.0.

As described in Section 2.3, a series of surface radiation surveys have been conducted throughout the IA (including OU9) in an effort to delineate potential radiation "hot spots" in the soils at RFETS. The HPGe survey results tabulated in Appendix C have been illustrated in color on Plate 16. (Plates are bound separately from this report.) As described in the *OU9 RFI/RI Work Plan* (DOE 1992a), the surface radiation survey results may be used to identify additional test-area locations to be incorporated into the OPWL field investigation. However, because the surface radiation survey measures radioactive isotopes within the first 12 to 18 inches of soil (depending on the moisture content and density of the soil), the HPGe results would only effectively measure potential radiation leaks from that portion of the pipelines located within one to two feet of ground surface or where pipeline leaks may have surfaced. In addition, the HPGe results may be influenced by building "shine," where elevated radiation levels from a nearby building might influence HPGe readings.

The review effort for identifying additional test areas based on the surface radiation survey results involved the comparison of the field data (compiled on Plate 16) with the proposed test-area locations (illustrated on Plates 2 through 15). Areas of elevated radiation readings (illustrated on Plate 16) were compared to the test-area locations to ascertain whether any additional test areas within OU9 are warranted. The results of this evaluation indicate that those areas of elevated surface radiation readings (specific to OU9) have already been targeted with pipeline test areas, regardless of the pipeline depth below ground surface. As a result, no additional test areas for the surface radiation survey results obtained within the IA are proposed.

Additional surface radiation surveys may be conducted during the OPWL field investigation in areas where pipelines surface and connect to surface vaults or other structures. These surveys may be conducted as part of RFETS Health and Safety Department's 17-point survey that is required to be conducted before any intrusive activities are begun, or it may be conducted independently with NaI equipment. In the event that elevated radiation readings are observed during these surveys, an HPGe survey will be conducted to provide isotope delineation. Radiation survey techniques and approved operating procedures are discussed in Section 5.1.2.

4.3 FIELD INVESTIGATION DECISION GUIDELINES

As discussed in Section 4.0, the OU9 OPWL field investigation has been divided into a series of decision-making steps that will allow the field team to select an investigative approach that best fits the site-specific conditions for each pipeline. Figure 4-1 shows an overview of the proposed OPWL field investigation process consisting of seven decision-making steps involved with the OPWL investigation and lists the primary components involved with each step. The decision tree illustrated in Figure 4-2 shows additional details of the investigation that demonstrate how these eight decision-making steps interrelate, lists the primary considerations to be addressed, and lists activities to be performed under each block. Figure 4-2 demonstrates the overall sampling approach for OU9 OPWL and will be referenced by the OU9 manager and the field team during the OPWL investigation. Table 4-2 provides a brief narrative for each of the decision points listed in Figure 4-2. Each of the seven decision-making steps and its respective activities illustrated in Figure 4-2 are discussed in detail in the following subsections.

4.3.1 Pipeline Applicability to OPWL Field Investigations

The objective of the OPWL field investigation applicability evaluation is to ascertain whether the pipeline in question can be dismissed from the initial investigation of OU9 or is out of scope from the investigation as described in the *OU9 RFI/RI Work Plan* (DOE 1992a). As illustrated in Figure 4-2 (decision boxes 1.00 through 1.50), the following primary questions are to be considered under this initial OPWL applicability evaluation:

- Has the pipeline been incorporated into the new process waste transfer system as permitted RCRA units?
- Has the pipeline been converted to other active uses (e.g., used in connection with a fire plenum deluge system)?
- Do current site conditions prevent soil disturbance?
- Is the area under investigation considered part of another OU?

Table 4-2 provides additional clarity regarding these questions. The inherent assumption of this evaluation is that those pipelines located beneath or within existing buildings cannot practically be investigated at this time because of the nature of RFETS and the potential for disruption of operations. Therefore, the investigations of those pipelines or portions of pipelines located beneath or within buildings are deferred until RFETS closure.

If the pipeline in question fits into the categories designated by the first three bulleted questions, the investigation of the pipeline (or a portion of the pipeline) must be delayed until either (1) the pipeline is no longer in use, (2) site conditions allow soil disturbance, or (3) the building(s) is deactivated. Under these circumstances, it is unclear whether the pipeline in question will remain in OU9 or will be transferred to a separate "pending" OU.

If the pipeline or portion of pipeline in question is under investigation through a separate OU (e.g., OU4), the field investigation of that portion of the pipeline may be transferred into the other identified OU. Transfer would be based on similarity of historical use, potential for early action, or consistency of remedial action for the OU. Under this scenario, the pipeline or portion of pipeline to which these criteria apply will be removed from further investigation under OU9.

4.3.2 Pipeline Location Verification

Once the pipeline has been determined to be applicable to the OU9 field investigations, the data-compilation summaries provided in Section 3.0 and Appendix D should be referenced to determine whether the location, orientation, and configuration of the pipeline can be determined in the field. If, through the data compilation activities and site walks conducted at RFETS, the pipeline location can be identified through physical features such as manholes, valve vaults, etc., the investigation of that pipeline can proceed with the collection of environmental samples (Section 4.3.4). If questions remain concerning the exact location of the pipeline or if the pipeline has been removed, the field team will begin a series of evaluations designed to select the most appropriate locating method based on site conditions. These evaluations are summarized in Figure 4-3 and are described in Table 4-3. In general, the primary considerations involved with this pipeline location evaluation include the following:

- the type of pipeline material and the accessibility of the pipeline;
- site conditions; and

- confirmation that the pipeline location needs to be verified in the field (e.g., insufficient surface features such as manholes or valve vaults exist to accurately locate the pipeline).

The location evaluation presented in Figure 4-3 is designed in a fashion that allows the field team to select from a variety of proven and reliable pipeline locating methods. The most appropriate locating method is selected based on the construction material and accessibility of that pipeline. As illustrated in Figures 4-2 and 4-3, the field team may perform successive locating methods if prior methods do not succeed in locating the pipeline. As a last resort, exploratory pits or trenches may be used to locate the pipeline. However, excavation and soil disturbance criteria listed in Table 4-4 must be met for the area in question before excavation activities can take place.

4.3.3 Pipeline Removal from OU9

Pipelines or portions of pipelines may be subject to removal from OU9 if the pipeline was identified through verbal or written documentation but the past or present existence could not be confirmed through historical documents, drawings, or field verification and investigation techniques. Table 1-1 identifies four pipelines that may fall into this category: P-8, P-18, P-52, and P-57.

After the pipeline location and configuration have been established in the field, the investigation for the pipeline can advance to sample collection activities described in Section 4.3.4. After exhausting all means available, if the location of the OPWL or the former location of the pipeline cannot be verified in the field, the preliminary information regarding the existence of the pipeline in question will be reevaluated. If it is determined that information regarding the pipeline or portion of pipeline that cannot be located is erroneous, the OU9 manager will assess the need to pursue further investigations related to the pipeline in question or remove the pipeline from OU9 by completing a no-further-investigation report.

A summary of the OPWL field investigations will be provided in a technical memorandum at the completion of all proposed fieldwork (Section 4.4).

4.3.4 Pipeline Field Sampling

As described in Section 4.1, an observational approach will be used during the field investigations at OU9. This observational approach provides for a mechanism by which the field team may adjust the OPWL sampling approach to accommodate potential safety and logistical concerns related to the proposed test pits. Alternative sampling methods proposed within this observational approach include sample collection through advancement of boreholes, hydraulic sampling methods (e.g., Geoprobe® and Hydropunch®), hand-held augers, and shovels. The observational approach allows the OU9 manager to select the most appropriate sample collection method based on site conditions that include the use of test pits (where applicable). The sample collection method evaluation is presented in Figure 4-4 and is described in Table 4-5.

The sample collection evaluation presented in Figure 4-4 is divided into three categories:

- Collection of environmental samples;
- Collection of residue/wipe samples as well as internal surface dose rate measurements; and
- Pipeline integrity evaluation.

The pipeline integrity evaluation is discussed in Section 4.3.5. The remainder of this section will summarize the activities involved with the first two categories listed above.

4.3.4.1 Collection of Environmental Samples

Environmental samples to be collected at each proposed test area include surface-soil samples, subsurface-soil samples (vadose zone only), and groundwater samples (when encountered). A surface-soil sample will be collected from the center of the test area that is designed to determine whether contamination was deposited from an incidental surface-water spill. The only logistical consideration involved with the collection of a surface-soil sample includes the removal of overlying pavement or other surface cover.

Collection of subsurface samples requires consideration of even more factors related to site conditions. The first evaluation that must be performed when collecting subsurface-soil and groundwater samples is the determination of whether activities such as drilling, excavating, sampling, etc. can be conducted at the given area. Examples of the criteria that must be met for such activities include plant safety and security considerations that must be cleared with the appropriate RFETS agencies. Buried utilities located next to the proposed test areas can be identified by appropriate RFETS agencies. The utility drawings illustrated on Plates 1 through 15 may be used to assist the utility clearance. However, field verification of identified utilities must still be performed by qualified RFETS personnel. A complete list of the criteria for this evaluation is provided in Table 4-4.

In addition to the considerations listed in the previous paragraph, a soil disturbance permit must be obtained for the proposed test area. Guidelines and safety considerations for all excavation activities performed at RFETS and example forms necessary for soil disturbance permits are presented in the occupational safety procedure 1-B37-HSP-12.08, *Excavation and Trenching* (EG&G 1993a).

If a soil disturbance permit is not granted at the proposed test area, the field investigation will then focus on the next portion of this sampling effort: the collection of pipeline residue/wipe samples and internal dose rate measurements (Section 4.3.4.2). The collection of environmental samples such as soil and groundwater must be deferred until the site becomes amenable to soil excavation activities (i.e., building deactivation). A summary of the field data obtained during this investigation will be prepared in a technical memorandum upon completion of all OPWL field investigations. This technical memorandum is described in Section 4.4.

After the proposed test area has been cleared for soil disturbance activities, the OU9 Manager must evaluate the given site conditions to determine the most appropriate method of sample collection. Such considerations include depth of pipeline (if known), potential buried utility interferences, and local water table elevations. Sample collection through excavation of test pits will be the first sampling approach considered for each test area (conditions permitting) as proposed in the *OU9 RFI/RI Work Plan* (DOE 1992a). In the event that safety concerns arise for the proposed test pit, or logistical concerns (e.g., plant security or fire personnel require the proposed investigative area to remain clear) or other concerns listed in Section 4.1 or Table 4-4 apply to the proposed test pit, then alternative sample collection activities will be considered by the OU9 Manager. The decision tree outlined in Figure 4-4 and Table 4-5 illustrates the decision management tools necessary for this type of evaluation.

If a proposed test pit has been determined to be a potential safety concern or logistically impractical, the first preferred sampling approach alternative includes sample collection through advancement of boreholes and/or innovative hydraulic-sampling methods (e.g., Geoprobes®). When compared with test pits, the use of boreholes or hydraulic-sampling methods may be considered preferable because of the following considerations:

- minimize worker safety considerations;
- minimize handling of investigation-derived wastes; and
- more amenable to plant security and safety considerations.

If site conditions do not permit the use of test pits, boreholes, or hydraulic sampling methods, the preferred sample collection method involves using hand-held augers or shovels. This methodology is especially practical where buried utilities are of primary concern.

Sample collection methods involved with each sampling approach related to test pit sampling are described in Sections 5.1.8 through 5.1.10. Target sample depths for these methods will be consistent among the proposed sampling methods and are described in detail in Section 5.2.

4.3.4.2 Collection of Pipeline Samples/Measurements

After completion of sample collection activities, the *OU9 RFI/RI Work Plan* (DOE 1992a) specifies that, when possible, pipeline residue or wipe samples will be obtained. The collection of these samples will be dependent on the method used to collect the environmental samples. If the test pit method is used, the pipeline will be dismantled or cut open before collecting the residue or wipe sample. (Note: This sample collection activity will not be performed if groundwater is encountered within the test pit.) Manholes, valve vaults, cleanout ports, and other pipeline access ports are the preferred points of collection when other less intrusive sample collection activities are used to collect the environmental samples. In addition, inside radiological dose rate measurements will be obtained at the same access point by inserting a gamma radiation detector into the pipeline. These measurements will be useful in verifying process piping historical data and can be used as a basis for disposal criteria selection (DOE 1992a).

4.3.4.3 Safety Contingency Actions

As illustrated in Figure 4-4, contingency measures are built into the sample collection method evaluation to assist the OU9 manager in situations where either locating or sampling activities create unsafe conditions for onsite workers or the general RFETS public. These measures are described in decision box series 4.50 through 4.55 of Figure 4-4 and are further described in Table 4-5. Additional contingency scenarios and corrective measures are provided in Table 4-6.

4.3.5 Pipeline Integrity Evaluation

The last data collection activity is the evaluation of the integrity of the pipelines. The pipeline integrity evaluation will be conducted through a series of tests including pressure testing, video inspections, visual inspections, and confirmation soil sampling (Section 4.3.5). The applicability of these tests to the OPWL field investigation is described in the following sections.

The *OU9 RFI/RI Work Plan* (DOE 1992a) originally designated the use of pressure testing and video inspections to assist in the evaluation of those sections of pipelines that were not inspected within the scope of the sampling activities conducted in the test areas. The pressure testing results were to be used in conjunction with historical data to determine whether a particular pipeline section (not inspected with test areas) should be removed from further investigation and, more importantly, from having to be addressed by a final remedial action at OU9. However, because historical data for many of the pipelines are incomplete, conclusions based on the pressure testing results will have to take into account the uncertainty of a particular pipeline's operating history. In addition, the following factors affect the applicability of pipeline pressure testing and the interpretation of the results:

- Pipeline materials and diameter may not be conducive to pressure testing.

- Many pipelines transferred waste through gravity flow and, therefore, were not pressurized. Pressure testing of these lines should be designed to approximate the operating pressures of the pipelines to the extent possible.

- The majority of the pipelines have been inactive for 15 to 20 years or more. Any leaks detected in the pipelines may have developed after the pipelines were removed from service.

- Contamination may exist at locations where leaks were detected in pipelines and the pipelines were subsequently excavated and repaired. Contamination may also exist at locations where a replacement pipeline was installed in the same alignment where an older, leaking pipeline was removed. Pipelines which currently test "tight" may have been repaired or may be a replacement line for an older pipeline that leaked. Historical data may help identify locations of pipeline repair and replacement. However, it is expected that maintenance and construction records for the pipelines will be incomplete, particularly for the early operations of RFETS (1950s and 1960s).

The potential applicability and benefits of pipeline video inspection depend on the same factors as those listed for pipeline pressure testing. Regardless, both the pressure testing and the video inspections will be conducted on pipelines inspected during this investigation (where feasible and where potential results justify effort and expense).

In an effort to supplement the data required to perform the pipeline integrity evaluation, additional soil and groundwater confirmation sample collection activities are proposed along the length of the pipelines to further ascertain the presence of contaminants within the surrounding media of the pipelines. This additional confirmation sampling will be performed with the use of hydraulic sampling methods (e.g., Geoprobe® and Hydropunch®). The confirmation sampling will take place on 20-foot centers on either side of the test areas identified as contaminated by initial test area analytical results for the OPWL to be investigated under OU9 (Figure 4-5). Confirmational sampling will only occur when contamination is detected at the initial test area and will continue at 20-foot centers until no contamination is detected above PRGs in the soils and/or groundwater.

Additional confirmational sampling will only occur when contaminant concentrations observed during this additional confirmation sampling effort exceed the PRGs established for contaminated subsurface soils at RFETS, the sampling effort will not be expanded to ascertain whether the contaminant plume has migrated outside the pipeline trench material into the surrounding native soils and groundwater. A list of the PRGs (DOE 1994b) established for RFETS subsurface soils has been included in Appendix F. The construction worker exposure scenario PRGs will be used as the basis for comparison. These data will assist in scoping additional sample collection activities proposed under subsequent stages of field investigations pertinent to OU9.

Sample collection points and analyses will match the same target depths and analytes as the associated test area sampling. Sample collection methodology and handling procedures are described in Section 5.0.

4.3.6 Early Action Evaluation

Early action (i.e., source removal) considerations will take place following the completion of the OPWL field investigations in the event that characterization activities identify potential threats to public health and the environment. If source removal activities are considered necessary by the OU9 manager and the data necessary to support the early removal action have been obtained through the OPWL field investigations, the OU9 manager will provide a recommendation to the RFETS under a PAM or by the Accelerated Cleanup Team. Table 4-7 lists the criteria and minimum requirements to be met for implementing an early removal action. PAM activities will be performed under OU9. However, a summary of the field results obtained during the OPWL sampling activities for the pipeline in question and the associated rationale related to the early removal recommendations will be provided in a technical memorandum to be submitted upon completion of all OU9 fieldwork (Section 4.4).

The PAM process will be initiated to provide timely actions to mitigate a threat or potential threat to public health and the environment. The process will be initiated only if it can be implemented within six months.

The PAM shall be a primary document and shall contain a brief summary of the data for the site and an explanation of how the proposed action is consistent with long-term remedial action objectives (e.g., no further action). The PAM will be issued to the state and EPA and will be consistent with the objectives of the OU9 RFI/RI Work Plan.

Once pipelines have been identified for early action (e.g., PAM), they will remain under OU9 but separated from the original pipeline investigation.

4.4 STAGE 1 INVESTIGATION COMPLETION

As illustrated in Figure 4-1, the results of the OPWL field investigations will ultimately lead to some form of remedial decision for the pipelines under investigation. Based on the data obtained from the field investigations, the pipelines or portions of pipelines may be transferred to a separate operable unit or eliminated from further action because of lack of contamination. If the pipelines are still in use or cannot be investigated by any means at this time because of security or safety concerns associated with the proposed sampling efforts, the investigation of the pipeline will have to be deferred until either the safety or security concern is eliminated or the plant closes. If the past pipeline operations have contaminated the surrounding media, then source removal and/or further delineation of the extent of contamination can begin.

The observational approach involved with the OPWL field investigation lends itself to decisions that must be made in the field regarding the fate of the pipeline investigation. Recommendations will be prepared in a technical memorandum to be submitted upon completion of all OPWL field investigations for either pipeline remedial decisions (including no further investigations), removal actions, or deference of the investigation until building deactivation. This memorandum will also summarize the required additional investigations (if any) required to meet the RFI/RI objectives stated within the *OU9 RFI/RI Work Plan* (DOE 1992a).

Appendix G summarizes the investigative requirements from the IAG (DOE et. al 1991), the *OU9 RFI/RI Work Plan* (DOE 1992a), and the proposed action described in this technical memorandum.

4.5 FIELD INVESTIGATION RECOMMENDATIONS

Based on the data obtained during the site walks and the review of existing records, a table has been prepared that summarizes recommendations for initiating the OPWL field investigation. Table 4-8 provides recommended "starting points" for each pipeline for the field team to use when beginning their investigation. Recommendations may include but are not limited to the following:

- Transfer the pipeline or portions of the pipeline to other OUs.
- Defer the investigation until the pipeline is inactive or until plant closure.
- Begin investigation at the "Pipeline Locating Evaluation" (Figure 4-3).
- Begin investigation at the "Pipeline Sample Method Evaluation" (Figure 4-4).

TABLE 4-1
Test Area Locations
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

PIPELINE NO., TEST AREA NO.	APPROXIMATE LOCATION									REMARKS
	PLATE NO.	CLOSEST BLDG(S)	NORTH COORD.	EAST COORD.	2ND LINE NO., TEST AREA NO.	3RD LINE NO., TEST AREA NO.	4TH LINE NO., TEST AREA NO.	5TH LINE NO., TEST AREA NO.	6TH LINE NO., TEST AREA NO.	
P-1, TA-1	11	123	36062	18546						
P-1, TA-2	11	123	36062	18617						
P-2, TA-1	11	123	36064	18619						
P-3, TA-1	11	123	36062	18621						
P-3, TA-2	11	123	36062	18650						
P-3, TA-3	11	123	36062	18684						
P-3, TA-4	11	123	36082	18684						
P-3, TA-5	11	441	36082	18760						
P-4, TA-1	11 ,12, 13, 14	441	36056	18790						
P-4, TA-2	11 ,12, 13, 14	441	36056	19010						
P-4, TA-3	11 ,12, 13, 14	441	36056	19164						
P-4, TA-4	11 ,12, 13, 14	441	36056	19310	P-5, TA-5					
P-4, TA-5	11 ,12, 13, 14	441	36056	19350						
P-4, TA-6	11 ,12, 13, 14	441	36030	19413						
P-4, TA-7	11 ,12, 13, 14	441	36030	19613						
P-4, TA-8	11 ,12, 13, 14	441	36030	19680						
P-4, TA-9	11 ,12, 13, 14	441	36030	19813						
P-4, TA-10	11 ,12, 13, 14	441	36030	20013						
P-4, TA-11	11 ,12, 13, 14	441	36030	20125						
P-4, TA-12	11 ,12, 13, 14	441	36030	20213						
P-4, TA-13	11 ,12, 13, 14	441	36030	20390						
P-4, TA-14	11 ,12, 13, 14	441	36030	20560						
P-5, TA-1	12	444	35928	19280						
P-5, TA-2	12	444	35945	19300						
P-5, TA-3	12	444	36025	19300						
P-5, TA-4	12	444	36025	19310						
P-5, TA-5	12	441	36056	19310	P-4, TA-4					
P-6, TA-1	14, 15	881	35447	20680						
P-6, TA-2	14, 15	881	35447	20560						
P-6, TA-3	14, 15	881	35647	20560						
P-6, TA-4	14, 15	883	35847	20560						
P-6, TA-5	14, 15	879	36026	20560						
P-6, TA-6	14, 15	879	36034	20560						
P-6, TA-7	14, 15	884	36188	20560	P-10, TA-5					
P-6, TA-8	14, 15	884	36194	20560						
P-6, TA-9	14, 15	884	36228	20560	P-9, TA-6					
P-7	15	881	NA	NA						PART OF NEW PWTS
P-8										DOES NOT EXIST
P-9, TA-1	14	883	35924	20672						
P-9, TA-2	14	883	35924	20586						
P-9, TA-3	14	883	35944	20568						

TABLE 4-1
Test Area Locations
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

PIPELINE NO., TEST AREA NO.	APPROXIMATE LOCATION									REMARKS
	PLATE NO.	CLOSEST BLDG(S)	NORTH COORD.	EAST COORD.	2ND LINE NO., TEST AREA NO.	3RD LINE NO., TEST AREA NO.	4TH LINE NO., TEST AREA NO.	5TH LINE NO., TEST AREA NO.	6TH LINE NO., TEST AREA NO.	
P-9, TA-4	14	883	36030	20568						
P-9, TA-5	14	883	36191	20568	P-10, TA-6					
P-9, TA-6	14	883	36228	20560	P-6, TA-9					
P-10, TA-1	14	865	36125	20970						
P-10, TA-2	14	865	36125	20880						
P-10, TA-3	14	865	36191	20880						
P-10, TA-4	14	889	36191	20745						
P-10, TA-5	14	889	36191	20740						
P-10, TA-6	14	884	36191	20560		P-9, TA-5				
P-10, TA-7	14	889	36134	20722						
P-10, TA-8	14	889	36134	20680						
P-10, TA-9	14	889	36138	20677						
P-10, TA-10	14	889	36171	20677						
P-10, TA-11	14	889	36171	20685						
P-10, TA-12	14	889	36191	20685						
P-11, TA-1	10, 14	884	36234	20560						
P-11, TA-2	10, 14	884	36410	20560	P-12, TA-1	P-13, TA-1				
P-12, TA-1	10	707	36410	20560	P-11, TA-2	P-13, TA-1				
P-12, TA-2	10	707	36665	20560	P-13, TA-2					
P-12, TA-3	10	707	36800	20560	P-13, TA-3					
P-12, TA-4	10	707	36900	20560	P-13, TA-4		P-13, TA-4			
P-13, TA-1	10	707	36410	20560	P-11, TA-2	P-12, TA-1				
P-13, TA-2	10	707	36665	20560	P-12, TA-2					
P-13, TA-3	10	707	36800	20560	P-12, TA-3					
P-13, TA-4	10	707	36900	20560			P-12, TA-4			
P-14, TA-1	10, 6	707	36910	20564						
P-14, TA-2	6, 10	707	37045	20695						
P-14, TA-3	6, 10	707	37264	20885						
P-14, TA-4	6, 10	778	37300	20927						
P-14, TA-5	6, 10	778	37355	20977						
P-14, TA-6	6, 10	778	37370	20990						
P-14, TA-7	6, 10	778	37383	20990						
P-15, TA-1	6	707	36910	20560						
P-15, TA-2	6	707	37069	20560						
P-15, TA-3	5	707	37073	20560						
P-15, TA-4	6	707	37182	20560						
P-15, TA-5	6	707	37284	20560						
P-15, TA-6	6	707	37284	20686						
P-15, TA-7	6	707	37284	20813						
P-15, TA-8	6	707	37284	20930	P-19, TA-3					
P-16, TA-1	5, 6	528	37072	20445						

TABLE 4-1
Test Area Locations
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

PIPELINE NO., TEST AREA NO.	APPROXIMATE LOCATION									REMARKS
	PLATE NO.	CLOSEST BLDG(S)	NORTH COORD.	EAST COORD.	2ND LINE NO., TEST AREA NO.	3RD LINE NO., TEST AREA NO.	4TH LINE NO., TEST AREA NO.	5TH LINE NO., TEST AREA NO.	6TH LINE NO., TEST AREA NO.	
P-16, TA-2	5, 6	528	37072	20560						
P-17, TA-1	5	559	37216	20408						
P-17, TA-2	5	559	37126	20412						
P-17, TA-3	5	559	37124	20406						
P-17, TA-4	5	559	37124	20384						
P-17, TA-5	5	559	37120	20412						
P-17, TA-6	5	559	37084	20412						DOES NOT EXIST
P-18										
P-19, TA-1	6	707	37152	20911.5						
P-19, TA-2	6	707	37279	20911.5						
P-19, TA-3	6	707	37284	20930	P-15, TA-8					
P-20, TA-1	3, 6	778	37286	20936						
P-20, TA-2	3, 6	778	37293.2	20943						
P-20, TA-3	3, 6	778	37293.2	21058						
P-20, TA-4	3, 6	778	37355	21058						
P-20, TA-5	3, 6	777	37408	21058	P-20.1, TA-1					
P-20, TA-6	3, 6	777	37455	21058						
P-20, TA-7	3, 6	777	37682	21045						
P-20, TA-8	3, 6	777	37682	20990						
P-20, TA-9	3, 6	703	37714	20990	P-41, TA-5	P-37, TA-4	P-41.1, TA-1			
P-20, TA-10	3, 6	777	37720	20990	P-41.1, TA-2					SPUR TO 729
P-20.1, TA-1	6	729	37408	21058	P-20, TA-5					SPUR TO 729
P-20.1, TA-2	6	729	37408	21103						
P-21, TA-1	3	703	37736	20990	P41.1, TA-3					
P-21, TA-2	3	713	37830	20990	P34.1, TA-2	P-41.1, TA-4				
P-21, TA-3	3	774	37912	20990	P-25, TA-4	P-34, TA-1	P34.1,TA-1			
P-21, TA-4	3	774	37922	20990						
P-21, TA-5	3	774	37936	20978						
P-21, TA-6	3	774	37982	20978						
P-21, TA-7	3	774	37982	20968						INACCESSIBLE
P-21, TA-8	3	774	38023	20968						
P-22, TA-1	3	771	38175	20588						
P-22, TA-2	3	771	38190	20605						
P-22, TA-3	3	771	38207	20605						IS PART OF FIRE PLENUM
P-23	3	771								
P-24, TA-1	3	771	38207	20615						
P-24, TA-2	3	771	38197	20615						
P-24, TA-3	3	771	38197	20760						
P-24, TA-4	3	771	38197	20891	P-25, TA-9			P-43, TA-6	P-58, TA-4	
P-25, TA-1	3	771	37798	21076	P-44, TA-6	P-59, TA-1		P-44, TA-5	P-58, TA-3	P-59, TA-2
P-25, TA-2	3	771	37798	21069	P-34.1, TA-3	P41.1, TA-5	P-43, TA-5			

TABLE 4-1
Test Area Locations
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

PIPELINE NO., TEST AREA NO.	APPROXIMATE LOCATION									REMARKS
	PLATE NO.	CLOSEST BLDG(S)	NORTH COORD.	EAST COORD.	2ND LINE NO., TEST AREA NO.	3RD LINE NO., TEST AREA NO.	4TH LINE NO., TEST AREA NO.	5TH LINE NO., TEST AREA NO.	6TH LINE NO., TEST AREA NO.	
P-25, TA-3	3	771	37912	21069						
P-25, TA-4	3	771	37912	20988	P-34, TA-1	P-21, TA-3	P-34.1, TA-1			
P-25, TA-5	3	771	37912	20952						
P-25, TA-6	3	771	37982	20896						
P-25, TA-7	3	771	38088	20896						
P-25, TA-8	3	771	38140	20896	P-33, TA-2					
P-25, TA-9	3	771	38186	20896	P-24, TA-4					
P-26, TA-1	3, 4	774	38072	21081						PIPELINE PART OF OU4
P-26, TA-2	3, 4	774	38033	21152						
P-27, TA-1	3	774	37932	21077	P-29, TA-4	P-28, TA-5				
P-27, TA-2	3	774	37997	21077	P-29, TA-5					
P-27, TA-3	3	774	38052	21077	P-29, TA-6					
P-27, TA-4	3	774	38015	21060	P-29, TA-7					
P-27, TA-5	3	774	38015	21025	P-29, TA-8					
P-28, TA-1	3	774	37776	21077						
P-28, TA-2	3	774	37786	21077	P-29, TA-1					
P-28, TA-3	3	774	37797	21077	P-29, TA-2					
P-28, TA-4	3	774	37832	21077	P-29, TA-3					
P-28, TA-5	3	774	37931	21077	P-29, TA-4	P-27, TA-1				
P-29, TA-1	3	774	37786	21078	P-28, TA-2					
P-29, TA-2	3	774	37797	21078	P-28, TA-3					
P-29, TA-3	3	774	37832	21078	P-28, TA-4					
P-29, TA-4	3	774	37931	21078	P-28, TA-5	P-27, TA-1				
P-29, TA-5	3	774	37997	21078	P-27, TA-2					
P-29, TA-6	3	774	38052	21078	P-27, TA-3					
P-29, TA-7	3	774	38015	21060	P-27, TA-4					
P-29, TA-8	3	774	38015	21025	P-27, TA-5					
P-30, TA-1	3	776/777	37660	20770	P-32, TA-4					
P-30, TA-2	3	776/777	37669	20770	P-32, TA-5	P-30.1, TA-2				
P-30, TA-3	3	776/777	37678	20770	P-30.2, TA-2					
P-30, TA-4	3	776/777	37710	20770	P-32, TA-6					
P-30.1, TA-1	3	776/777	37669	20798						SPUR
P-30.1, TA-2	3	776/777	37669	20770	P-30, TA-2	P-32, TA-5				
P-30.2, TA-1	3	776/777	37678	20807						
P-30.2, TA-2	3	776/777	37678	20770	P-30, TA-4					
P-31	3	771/774								IN UTILITY TUNNEL
P-32, TA-1	3, 6	777	37367	20616						
P-32, TA-2	3, 6	777	37367	20765						
P-32, TA-3	3, 6	777	37392	20765						
P-32, TA-4	3, 6	777	37660	20765	P-30, TA-1					
P-32, TA-5	3, 6	777	37669	20765	P-30, TA-2	P30.1, TA-2				

TABLE 4-1
Test Area Locations
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

PIPELINE NO., TEST AREA NO.	APPROXIMATE LOCATION									REMARKS
	PLATE NO.	CLOSEST BLDG(S)	NORTH COORD.	EAST COORD.	2ND LINE NO., TEST AREA NO.	3RD LINE NO., TEST AREA NO.	4TH LINE NO., TEST AREA NO.	5TH LINE NO., TEST AREA NO.	6TH LINE NO., TEST AREA NO.	
P-32, TA-6	3, 6	777	37710	20765	P30, TA-4					
P-33, TA-1	3	771	38140	20788						
P-33, TA-2	3	771	38140	20896	P-25, TA-8					
P-33, TA-3	3	771	38140	20912	P-34, TA-6					
P-33, TA-4	3	771	38140	20935						
P-34, TA-1	3	774	37912	20988	P-25, TA-4	P-21, TA-3	P-34, TA-1			
P-34, TA-2	3	774	38005	20988						
P-34, TA-3	3	774	38048	20972						
P-34, TA-4	3	774	38048	20912						
P-34, TA-5	3	774	38087	20912						
P-34, TA-6	3	774	38140	20912	P-33, TA-3					
P-34.1, TA-1	3	774	37912	20988	P-21, TA-3	P-25. TA-4	P-34, TA-1			
P-34.1, TA-2	3	774	37798	20988	P-21, TA-2	P-41.1, TA-5	P-43, TA-5	P-44, TA-5	P-58, TA-3	P-59, TA-2
P-34.1, TA-3	3	774	37798	21069	P-25, TA-2					
P-35, TA-1	3	774	37797	21077	P-46, TA-1					PIPELINE PART OF OU4
P-35, TA-2	3	774	37797	21123	P-46, TA-2					
P-35, TA-3	3	774	37797	21137	P-46, TA-3					
P-35, TA-4	3	774	37694	21133	P-46, TA-4					
P-35, TA-5	3	774	37687	21133	P-46, TA-5					
P-36, TA-1	3, 4	774	37731	20990	P-58, TA-1					PIPELINE PART OF OU4
P-36, TA-2	3, 4	774	37731	21046						
P-36, TA-3	3, 4	774	37716	21050	P-44, TA-1	P-43, TA-1				
P-36, TA-4	3, 4	774	37716	21057	P-37, TA-6					
P-36, TA-5	3, 4	774	37716	21202	P-37, TA-7	P-38, TA-2				
P-36, TA-6	3, 4	774	37716	21375	P-37, TA-8	P-38, TA-3				
P-36, TA-7	3, 4	774	37716	21495	P-37, TA-9	P-48, TA-1				
P-36, TA-8	3, 4	774	37714	21500	P-37, TA-10	P-47, TA-1				
P-37, TA-1	3, 4	777	37728	20780	P-41, TA-8					PIPELINE PART OF OU4
P-37, TA-2	3, 4	777	37728	20944	P-41, TA-7					
P-37, TA-3	3, 4	777	37714	20957	P-41, TA-6					
P-37, TA-4	3, 4	777	37714	20990	P-41, TA-5	P-20, TA-9	P-41.1, TA-1			
P-37, TA-5	3, 4	777	37714	21043	P-41, TA-4	P-59, TA-4				
P-37, TA-6	3, 4	779	37714	20057	P-36, TA-4					
P-37, TA-7	3, 4	779	37714	21200	P-38, TA-2	P-36, TA-5				
P-37, TA-8	3, 4	779	37714	21375	P-36, TA-6	P-38, TA-3				
P-37, TA-9	3, 4	207A	37714	21495	P-36, TA-7	P-48, TA-1				
P-37, TA-10	3, 4	207A	37714	21500	P-36, TA-8	P-47, TA-1				
P-37, TA-11	3, 4	207A	37710	21498	P-47, TA-2					
P-37, TA-12	3, 4	207A	37575	21496	P-38, TA-7					
P-37, TA-13	3, 4	207A	37450	21496		P-38, TA-8				
P-37, TA-14	3, 4	207A	37450	21660						

TABLE 4-1
Test Area Locations
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

PIPELINE NO., TEST AREA NO.	APPROXIMATE LOCATION									REMARKS
	PLATE NO.	CLOSEST BLDG(S)	NORTH COORD.	EAST COORD.	2ND LINE NO., TEST AREA NO.	3RD LINE NO., TEST AREA NO.	4TH LINE NO., TEST AREA NO.	5TH LINE NO., TEST AREA NO.	6TH LINE NO., TEST AREA NO.	
P-37, TA-15	3, 4	207A	37450	21805						
P-37, TA-16	3, 4	910	37400	21805	P-39, TA-3					
P-38, TA-1	3, 4, 7	779	37782	21133						
P-38, TA-2	3, 4, 7	779	37714	21200	P-36, TA-5	P-37, TA-7				
P-38, TA-3	3, 4, 7	779	37714	21375	P-36, TA-6	P-37, TA-8				
P-38, TA-4	3, 4, 7	779	37714	21471						
P-38, TA-5	3, 4, 7	779	37712	21495						
P-38, TA-6	3, 4, 7	779	37590	21495						
P-38, TA-7	3, 4, 7	779	37575	21490	P-37, TA-12					
P-38, TA-8	3, 4, 7	779	37450	21490	P-37, TA-13					
P-38, TA-9	3, 4, 7	779	37400	21490	P-39, TA-1					
P-39, TA-1	7, 8, 9	782	37400	21490	P-38, TA-9					
P-39, TA-2	7, 8, 9	207-A	37400	21650						
P-39, TA-3	7, 8, 9	910	37400	21805	P-37, TA-16					
P-39, TA-4	7, 8, 9	910	37400	21940						
P-39, TA-5	7, 8, 9	965	37400	22208						
P-39, TA-6	7, 8, 9	990	37380	22350						
P-39, TA-7	7, 8, 9	990	37357	22512						
P-39, TA-8	7, 8, 9	990	37334	22652	P-40, TA-1					
P-39, TA-9	7, 8, 9	990	37300	22928						
P-39, TA-10	7, 8, 9	990	37287	23240						
P-40, TA-1	8, 9	990	37334	22652	P-39, TA-8					
P-41, TA-1	3, 4	779	37553	21101	P-42, TA-1					
P-41, TA-2	3, 4	779	37665	21101	P-42, TA-2					
P-41, TA-3	3, 4	779	37710	21050	P-42, TA-3					
P-41, TA-4	3, 4	777	37713	21045	P-59, TA-4	P-37, TA-5				
P-41, TA-5	3, 4	777	37716	20990	P-37, TA-4	P-20, TA-9	P-41.1, TA-1			
P-41, TA-6	3, 4	777	37716	20957	P-37, TA-3					
P-41, TA-7	3, 4	777	37730	20944	P-37, TA-2					
P-41, TA-8	3, 4	777	37730	20780	P-37, TA-1					
P-41.1, TA-1	3	703	37716	20990						
P-41.1, TA-2	3	703	37720	20990	P-20, TA-10					
P-41.1, TA-3	3	703	37736	20990	P-21, TA-1					
P-41.1, TA-4	3	703	37797	20990	P-21, TA-2	P-34.1, TA-2				
P-41.1, TA-5	3	703	37797	21069	P-25, TA-2	P-34.1, TA-3	P-43, TA-5	P-44, TA-5	P-58, TA-3	P-59, TA-2
P-42, TA-1	3, 6	779	37551	21100	P-41, TA-1					
P-42, TA-2	3, 6	779	37663	21100	P-41, TA-2					
P-42, TA-3	3, 6	779	37710	21050	P-41, TA-3					
P-43, TA-1	3	703	37714	21049	P-44, TA-1	P-36, TA-3				
P-43, TA-2	3	703	37768	21049	P-44, TA-2	P-45, TA-2				
P-43, TA-3	3	703	37789	21069	P-44, TA-3					

TABLE 4-1
Test Area Locations
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

PIPELINE NO., TEST AREA NO.	APPROXIMATE LOCATION									REMARKS
	PLATE NO.	CLOSEST BLDG(S)	NORTH COORD.	EAST COORD.	2ND LINE NO., TEST AREA NO.	3RD LINE NO., TEST AREA NO.	4TH LINE NO., TEST AREA NO.	5TH LINE NO., TEST AREA NO.	6TH LINE NO., TEST AREA NO.	
P-43, TA-4	3	703	37797	21069	P-44, TA-4					
P-43, TA-5	3	774	37797	21076	P-44, TA-5	P-25, TA-2	P-34.1, TA-3	P-41.1, TA-5	P-58, TA-3	P-59, TA-2
P-43, TA-6	3	774	37797	21080	P-25, TA-1	P -44, TA-6	P-58, TA-4	P-59, TA-1		
P-44, TA-1	3	703	37715	21048	P-43, TA-1	P-36, TA-3				
P-44, TA-2	3	703	37767	21048	P-43, TA-2	P-45, TA-2				
P-44, TA-3	3	703	37789	21074	P-43, TA-3					
P-44, TA-4	3	703	37795	21074	P-43, TA-4					
P-44, TA-5	3	774	37795	21076	P-43, TA-5	P-25, TA-2	P-34.1, TA-3	P-41.1, TA-5	P-58, TA-3	P-59, TA-2
P-44, TA-6	3	774	37795	21080	P-25, TA-1	P-43, TA-6	P-58, TA-4	P-59, TA-1		
P-45, TA-1	3	703	37746	21049						
P-45, TA-2	3	703	37728	21067	P-43, TA-2	P-44, TA-2				
P-45, TA-3	3	703	37728	21091						
P-45, TA-4	3	703	37763	21126						
P-45, TA-5	3	703	37780	21126						
P-45, TA-6	3	703	37746	21043						
P-45, TA-7	3	703	37783	21130		P-61, TA-2				
P-46, TA-1	3	774	37798	21077	P-35, TA-1					PIPELINE PART OF OU4
P-46, TA-2	3	774	37798	21123	P-35, TA-2					
P-46, TA-3	3	774	37798	21137	P-35, TA-3					
P-46, TA-4	3	774	37694	21137	P-35, TA-4					
P-46, TA-5	3	774	37687	21137	P-35, TA-5					
P-47, TA-1	3,4	774	37714	21500	P-37, TA-10	P-36, TA-8				INCORPORATE IN OU 4
P-47, TA-2	3,4	774	37713	21500	P-37, TA-11					
P-48, TA1	3,4	774	37714	21495	P-36, TA-7	P-37, TA-9				INCORPORATE IN OU 4
P-49										INCORPORATE IN OU 4
P-50										INCORPORATE IN OU 4
P-51										INCORPORATE IN OU 4
P-52										INSIDE BLDG
P-53, TA-1		881/887	35208	20746						
P-53, TA-2	15	881	35155	20746						
P-53, TA-3	15	881	35155	20723						
P-54, TA-1	15	887	35089	20707						
P-54, TA-2	15	887	35138	20707						
P-55, TA-1	15	881/887	35208	20735						
P-55, TA-2	15	881/887	35138	20735						
P-55, TA-3	15	881/887	35138	20732						
P-56, NA	3	771 -774								IN UTILITY TUNNEL, MAY BE NEW
P-57, NA										EVIDENCE INDICATES DOES NOT EXI
P-58, TA-1	3	703	37728	20990	P-36, TA-1					NEWLY IDENTIFIED PIPELINES
P-58, TA-2	3	703	37728	21043	P-59, TA-3					
P-58, TA-3	3	703	37796	21074	P-59, TA-2	P-44, TA-5	P-43, TA-5	P-25, TA-2	P34.1, TA-3	P-41.1, TA-5

TABLE 4-1
Test Area Locations
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

PIPELINE NO., TEST AREA NO.	APPROXIMATE LOCATION									REMARKS
	PLATE NO.	CLOSEST BLDG(S)	NORTH COORD.	EAST COORD.	2ND LINE NO., TEST AREA NO.	3RD LINE NO., TEST AREA NO.	4TH LINE NO., TEST AREA NO.	5TH LINE NO., TEST AREA NO.	6TH LINE NO., TEST AREA NO.	
P-58, TA-4	3	703	37796	21079	P-59, TA-1	P-44, TA-6	P-43, TA-6	P-25, TA-1		
P-59, TA-1	3	703	37795	21079	P-58, TA-4	P-44, TA-6	P-43, TA-6	P-25, TA-1		NEWLY IDENTIFIED PIPELINES
P-59, TA-2	3	703	37795	21074	P-58, TA-3	P-44, TA-5	P-43, TA-5	P-25, TA-2	P-41.1, TA-3	P41.1, TA-5
P-59, TA-3	3	703	37728	21043	P-58, TA-2	P-34.1, TA-3	P-41.1, TA-5			
P-59, TA-4	3	703	37715	21043	P-37, TA-5	P-41, TA-4				
P-60, TA-1	3	703	37783	21080	P-61, TA-1					NEWLY IDENTIFIED PIPELINES
P-60, TA-2	3	703	37776	21097						
P-60, TA-3	3	703	37776	21224						
P-61, TA-1	3	703	37785	21080	P-60, TA-1					NEWLY IDENTIFIED PIPELINES
P-61, TA-2	3	703	37785	21130						
P-62, TA-1	5	561	37072	20390						NEWLY IDENTIFIED PIPELINES
P-62, TA-2	5	561	37072	20410						
P-63, TA-1	14	886	36051	21287	P-64, TA-2					NEWLY IDENTIFIED PIPELINES
P-63, TA-2	14	886	36051	21263						
P-63, TA-3	14	886	36105	21271	P-66, TA-1					
P-63, TA-4	14	886	36067	21244						
P-64, TA-1	14	886	36075	21271						
P-64, TA-2	14	886	36051	21287	P-63, TA-1					
P-64, TA-3	14	886	36075	21244						
P-65, TA-1	14	886	36082	21243	P-66, TA-3					
P-65, TA-2	14	886	36128	21184						
P-66, TA-1	14	886	36105	21271	P-63, TA-3					
P-66, TA-2	14	886	36105	21243						
P-66, TA-3	14	886	36082	21243	P-65, TA-1					

TABLE 4-2
Conceptual OU9 Field Sampling Approach Description*
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

SAMPLING APPROACH/DECISION	NARRATIVE
1.00 Pipeline Identification from Technical Memorandum No. 1, Volume II - Pipelines.	Refer to Section 3.0 of the Technical Memorandum for identification of the 60+ OPWL pipelines specific to OU9.
1.10 Has pipeline been converted to part of the "new" Process Waste Transfer System (PWTS) as active RCRA units?	If only part of the identified pipeline has been converted, continue the investigation for that portion of the pipeline that has not been converted. Lines that were incorporated into and are currently part of the new process waste line are outside the scope of this project. For those portions of pipeline converted into the PWTS, refer to Decision Box 1.30.
1.20 Has pipeline been converted to other uses at RFETS?	If the pipeline has been converted to other active uses at RFETS, such as part of a fire plenum, then the pipeline cannot be investigated until plant closure. Lines that were incorporated into and are currently part of any active RFETS operations will be investigated at a later date when they become deactivated. For those portions of pipeline converted into active uses at RFETS, refer to Decision Box 1.30.
1.30 Defer investigation until RFETS closure.	If for any reason a pipeline or a portion of a pipeline cannot be investigated (i.e., out of scope for OU9 activities, investigative activities are not possible due to plant security or health and safety reasons, etc.) then the OU9 investigation of that pipeline or portion of pipeline should be deferred until RFETS closure.
1.40 Is the portion of pipeline under investigation considered part of a separate operable unit?	If the pipeline or portion of pipeline under investigation is considered part of another OU (i.e., OU4), then the field investigation pertaining to that portion of the pipeline included under another OU may be transferred out of OU9 and into the other operable unit.
1.50 Notify proper RFETS agencies.	When a pipeline or portion of a pipeline has been identified as being part of a separate OU, the proper RFETS agencies must be notified. That pipeline or portion of pipeline is then no longer considered part of OU9.
1.60 Do site conditions prevent soil disturbance?	Investigation activities are not possible because of plant security, health and safety reasons, proximity to active buried utilities, building structures, or subsequent description of operations. These conditions may result in deferral of the investigation until the potential for disruption is mitigated.

* Note: Refer to Figure 4-2 for corresponding number references.

TABLE 4-2
Conceptual OU9 Field Sampling Approach Description*
OU9 original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

SAMPLING APPROACH/DECISION	NARRATIVE
Does pipeline location require field investigations?	Is there insufficient information available on the pipeline in question so that its location must be verified in the field?
2.00 Refer to Figure 4-3 - Pipeline Location Evaluation.	If the pipeline location needs to be verified in the field, the field team has a variety of locating methods and techniques to chose from. The selection of the most appropriate locating method is described in the pipeline locating decision tree (Figure 4-3). As illustrated in Figure 4-3, the locating method evaluation is repeated if the first method proves unsuccessful.
2.44, 2.46, and 2.52 Has pipeline configuration been located?	Has the pipeline location been successfully traced?
2.43, 2.45, 2.51, and 2.62 Other options available?	Given the site conditions, are there any other methods for locating the pipeline? If not, reassess the source of information of the pipeline and determine if it is reliable. If pipeline's existence is in doubt, delete pipeline from further OU9 investigations.
3.00 See Figure 4-4 - Pipeline Sampling Method Evaluation	Once the pipeline has been located, the method of sample collection is evaluated for the given site conditions. The complete sample method evaluation is presented in Figure 4-4.
3.20 Soil disturbance permit obtainable?	Since the collection of the required soil/groundwater samples per test area requires some form of intrusive sampling technique, it must be determined whether site conditions would permit intrusive activities such as boreholes, test pits, etc. As part of this evaluation, a soil disturbance permit must be obtained. This includes an evaluation of nearby buried utilities, building structures, plant security, etc. (Table 4-4).
3.21 - 3.50 Conduct pipeline sampling activities.	Once the appropriate soil sampling technique has been chosen for the given site conditions, the implementation of the chosen technique is then performed at the site in question. If the chosen technique is unsuccessful, the other methods are then considered. See Section 5.0 for sampling methodology descriptions.

* Note: Refer to Figure 4-2 for corresponding number references.

TABLE 4-2
Conceptual OU9 Field Sampling Approach Description*
OU9 original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

SAMPLING APPROACH/DECISION	NARRATIVE
4.00 Conduct pipeline integrity evaluation.	Based on site conditions and the method used to collect subsurface soil samples, conduct the pipeline integrity evaluation (Figure 4-4). This may involve additional samples collected along the length of the pipeline by hydraulic sample methods (Section 4.3.5.1).
4.40 Is the pipeline a candidate for an early removal action?	If worker or general public safety is of concern because of high contaminant concentrations observed at the test area, or if the extent of contamination has been clearly defined, recommend pipeline for an early action removal. Removal activities will be handled by the RFETS Accelerated Cleanup Team. This concept also applies to portions of a pipeline.
5.00 Are there any additional pipelines/test areas to be investigated?	If so, return to the top of Figure 4-2.
6.00 Submit Technical Memorandum 2 - Pipelines.	After all of the OU9 OPWLs have been investigated, prepare and submit the results of the field investigation in a technical memorandum.

Notes:
OU = Operable Unit
OPWL = Original Process Waste Lines
PWTS = Process Waste Transfer System
RFETS = Rocky Flats Environmental Technology Site

* Note: Refer to Figure 4-2 for corresponding number references.

TABLE 4-3
Pipeline Location Evaluation Description*
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

SAMPLING APPROACH/DECISION	NARRATIVE
2.00 Pipeline location needs field verification.	Sufficient information is not available on the pipeline so its location must be verified in the field. The location and/or coordinates for the line have not been established as a result of the data compilation process.
2.10 Pipeline location can be visually verified using ground surface features such as manholes, valve vaults, etc.	Are there sufficient surface features (manholes, valve vaults, lampholes, etc.) so that the pipeline location can be verified with a reasonable degree of certainty? If so, proceed to pipeline sampling efforts (Figure 4-4).
2.20 Has pipeline been removed from its original location?	If the data compilation and site walk activities have determined that the pipeline has been removed, then the locating activities are focused on techniques that do not require physical access to the pipeline. The locating activities will focus on locating the backfill/trench material of the removed pipeline.
2.30 Is approximate location of pipeline known?	Through either the data compilation or site walk activities, are there pieces of information available to approximately locate the pipeline? Is there enough information available to begin field verification techniques?
2.31 Is portion of pipeline location known?	Have coordinates for any portion of the alignment been identified through the data compilation process and verified in the field?
2.32 Can location of pipeline exit from building or structure be verified?	Inspect the inside of the building, valve vault, tunnel, manhole, etc. in the vicinity of the pipeline. If the pipe is accessible within buildings/structures, locate the pipe within the structure. Then identify the point where the line exits the structure and eliminate the need for more difficult and costly location procedures outside the building. Locating a portion of the line will aid in "tracing" the remainder of the line.
2.40 Begin pipeline locating method evaluation.	Once a portion of the pipeline location has been identified, the remainder of the pipeline must be traced and the alignment verified in the field. This task is accomplished through a variety of locating techniques that are selected based on site conditions and success and/or failure of easier, less destructive locating techniques. Section 5.1.5 provides the method descriptions to be used during this effort.

* Note: Refer to Figure 4-3 for corresponding number references.

TABLE 4-3
Pipeline Location Evaluation Description*
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

SAMPLING APPROACH/DECISION	NARRATIVE
2.41 Is pipe accessible from building, valve vault, etc.?	Can the interior of the pipeline be accessed? If so, choose the locating technique that is reliable, nondestructive, and best fits site-specific conditions. Access can be through a clean-out port, valve vault, manhole, etc.
2.42 Is pipe made of conductive material or does it include a trace wire?	Verify if the pipe is capable of conducting a current induced at its accessible origin. A current may also be applied to an associated trace wire if one has been installed on nonconductive pipes or can be inserted within the pipe.
2.43 Use electromagnetic inductive/conductive tracing techniques.	If the pipe in question is made of conductive material and/or contains a trace wire, the pipeline may be traced with common and proven electromagnetic tracing techniques. These methods are often used by public utility companies and are generally successful when used in the field (Section 5.1.5).
2.44 Has pipeline location been verified?	If the pipeline has been successfully traced with the locating technique, the field effort may then be focused toward implementing the sample collection effort for that pipeline.
2.45 Use transmitting sound or video locating techniques.	In the event that the electromagnetic tracing technique proves unsuccessful, the Work Plan discusses the use of either a transmitting sound technique or video locating methods (Section 5.1.5). Both techniques are nondestructive and can be implemented given accessibility to the pipeline.
2.46 Has pipeline location been verified?	If the pipeline has been successfully traced with the locating technique, the field effort may then be focused toward implementing the sample collection effort for that pipeline.
2.50 Is suspected area of pipe location mixed with other known pipelines and/or buried utilities?	In the event that the above locating techniques are unsuccessful, the remaining locating techniques available will be conducted from the ground surface down to the pipeline. As such, interferences such as other known pipelines or buried utilities may affect the applicability and the success of the remaining location options. If interferences exist in the test area, then the pipeline cannot be located, and the investigation for that test area(s) will have to be deferred until plant closure.

* Note: Refer to Figure 4-3 for corresponding number references.

TABLE 4-3
Pipeline Location Evaluation Description*
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

SAMPLING APPROACH/DECISION	NARRATIVE
2.51 Use ground penetrating radar or magnetic detection locating techniques.	The success of these locating techniques is dependent on depth of investigation and soil type. However, they are nondestructive and have been proven reliable under certain site conditions (Section 5.1.5).
2.52 Has pipeline location been verified?	If the pipeline has been successfully traced with the locating technique, the field effort may then be focused toward implementing the sample collection effort for that pipeline.
2.60 Would excavating activities fail any of the excavation considerations listed on Table 4-4?	The last locating option discussed in the Work Plan involves locating the pipeline using excavation activities. Several considerations regarding safety and security must be met for the given site conditions. If any of the considerations listed in Table 4-4 apply to the site in question, then the investigation of that portion of the pipeline should be deferred until plant closure.
2.61 Remove concrete/asphalt from excavation target area and collect surface soil sample.	Based on the potential that the excavation activity (if such activity is permitted) used at the site is located in an area that proves to be of interest (i.e., soil contamination found during excavation), it is prudent at this point to collect the required surface soil sample in the area in question. The sample can be held onsite until the need to submit it for analysis is determined.
2.62 Excavate "interceptor trench" to locate pipeline.	Attempt to find the pipeline by digging an "interceptor" trench at the anticipated location of the pipeline. Extend the trench until the trench intersects the pipeline. Some judgment will be required for determining when sufficient digging/trenching has been attempted and when the search should be terminated.
2.63 Has pipeline location been verified?	If the pipeline has been successfully traced with the locating technique, the field effort may then be focused toward implementing the sample collection effort for that pipeline. At this time, if the pipeline still has not been located, the source of the pipeline information should be reassessed. If the source is deemed unreliable or in error, then the investigation(s) for this particular pipeline should be cancelled.

* Note: Refer to Figure 4-3 for corresponding number references.

TABLE 4-4
Criteria For OU9 Excavation
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

POTENTIAL PROBLEM	DESCRIPTION
Required Documentation	Soil Disturbance Evaluation Form has been approved.
Utility Installations Interference	Test area is not located within a 10-foot radius of buried utilities (e.g., electrical, gas, steam, etc.) that cannot be deenergized as a result of security or operational requirements.
Hazardous Materials	Materials encountered during excavation activities would not cause an unreasonable exposure problem to site workers and general RFETS personnel.
Plant Security	Test area locations are deemed acceptable to RFETS Security and Fire Department.
Building Obstruction	Test area location would not damage or compromise building foundation(s) or related structural features.

NOTE: If any of the above criteria cannot be met for the test area where excavating activities are being evaluated, then the excavation activities (i.e., boreholes, test pits, and hydraulic sampling methods) should no longer be considered applicable to the test site.

TABLE 4-5
Pipeline Sampling Evaluation Description*
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

SAMPLING APPROACH/DECISION	NARRATIVE
3.00 Locate test areas from plates presented in Technical Memorandum 1, Volume II - Pipelines.	The test area location plates provided in Technical Memorandum 1, Volume II, will serve as field tool for locating each respective test area. The test areas were located based on the criteria listed in the Work Plan and reiterated in the Technical Memorandum.
3.10 Was interceptor trench used to locate pipeline?	This question is raised because, with pipeline exposed, an opportunity exists for collection of subsurface soil samples.
3.11 Does interceptor trench coincide with target test area?	As described above, subsurface soil samples may be collected from the interceptor trench. If the interceptor trench is located in or near a proposed test area, subsurface samples may be collected as the pit remains open (Section 5.2.2).
3.20 Do excavation activities meet the criteria listed in Table 4-4?	Since all of the sample collection activities involve some form of soil excavation, an evaluation of site conditions regarding plant security, public health, and worker safety must be made. If any of the criteria listed in Table 4-4 are not met, then the subsurface soil collection task for that portion of the pipeline should be deferred until plant closure. However, additional sample collection activities (e.g., residue/wipe samples) as well as a pipeline integrity inspection (e.g., pressure testing) may still be performed.
3.21 Remove concrete/asphalt from excavation target area and collect surface soil sample.	It is prudent at this point to collect the required surface soil sample in the area in question (Section 5.2.1).
3.30 Is pipeline depth greater than 4 feet below ground surface?	Because OSHA requirements mandate special precautionary measures (i.e., shoring) for any test pit greater than 4 feet in depth (including provisions for confined space entry) and the fact that hand augering or excavation with a shovel beyond 4 feet below ground surface at RFETS is anticipated to be extremely difficult, any sample collection activity that is anticipated to go beyond 4 feet will be conducted with either a hollow-stem auger drill rig or a hydraulic sampling method.

* Note: Refer to Figure 4-4 for corresponding number reference.

TABLE 4-5
Pipeline Sampling Evaluation Description*
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

SAMPLING APPROACH/DECISION	NARRATIVE
3.31 Collect soil/groundwater samples with hollow-stem auger drill rig or by hydraulic sampling methods.	As described above, subsurface soil and groundwater samples will be collected at specified depths and locations using a hollow-stem auger drill rig or by hydraulic sampling methods for those test areas where samples are to be collected at depths greater than 4 feet below ground surface (Sections 5.1.9 and 5.1.10). These sample collection methods are reliable and have been conducted successfully at RFETS.
3.40 Is test area located within 3 feet of buried utilities?	In accordance with RFETS HSP 12.08, *Excavations and Trenching*, picks, paving breakers, or earth moving equipment are not to be used within a 3-foot radius of identified buried utilities. Therefore, in order to choose between sample collection via a test pit (excavated with a backhoe) or hand-held augers or shovels, the field team needs to identify the relationship between the test area location and the nearest buried utility.
3.41 Collect soil/groundwater samples with a hand auger or shovel.	In the event that the proposed test area is located within a 3-foot radius of a buried utility, the sample collection activities will be conducted with either a hand-held auger or a shovel. Sample locations and depths are described within Section 5.2.
3.42 Are target sample depths below the anticipated groundwater level?	If the criteria listed above have been met, excavation of a test pit is then considered at the proposed test area. However, if the anticipated groundwater level is higher in elevation than the target sample depths, a test pit cannot be used (for safety reasons specified in RFETS HSP 12.08).
3.50 Excavate, log, and collect appropriate soil samples using a test pit.	When site conditions permit, the sample collection effort will be performed using a test pit. Test pits will be logged and sampled in accordance with Environmental Management Division's OPs specified in Section 5.1.8. Sample depths and locations are also specified in Section 5.2.
3.60 Has pipeline been removed from its original location?	If the pipeline has been removed, activities related to collection of residue/wipe sampling and pipeline integrity evaluation are no longer feasible. If this is the case for the pipeline in question, follow the decision tree down to that portion of the pipeline investigation that pertains to confirmation soil sampling activities.

* Note: Refer to Figure 4-4 for corresponding number reference.

TABLE 4-5
Pipeline Sampling Evaluation Description*
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

SAMPLING APPROACH/DECISION	NARRATIVE
3.70 Is access to pipeline interior available?	Can the interior of the pipeline be accessed? Access can be through a clean-out port, valve vault, manhole, etc.
3.71 Is there potential benefit from pressure testing or video inspection?	Would the data meet the DQOs for the pipeline integrity evaluation? Would the results be reliable enough to defend? Are the costs justifiable?
3.72 Can pipeline be pressure tested or video inspected?	Was the line designed to be pressurized? Pressure testing some gravity lines may not be advisable if they were never designed to be pressurized. It may not be practical to pressure test gravity lines with open tops or inaccessible feed lines. Nor should pressure testing be performed on lines that are obviously broken or with conditions that would indicate obvious problems during pressurization.
3.73 Perform pressure test or video inspection.	Pressure test the line at a pressure approximating the original operating pressure. If leaks are detected, determine the leak rate and try to locate the leak location(s). Video inspection may be used to help locate and inspect potential leaks (Section 5.1.11).
3.80 Was a test pit used to collect samples?	The next series of questions pertain to the collection of a residue/wipe sample in the pipeline.
3.81 Cut open or dismantle pipeline.	To collect a residue/wipe sample from the exposed pipeline, the field team will have to cut open or dismantle the pipeline to gain access to the pipe's interior. Follow contingency measures described in Table 4-6 if pipeline contains free product.
3.82 Collect residue/wipe sample from access.	If a borehole or a hydraulic sample method was used to collect subsurface soil/groundwater samples, collect the residue/wipe sample from an access port of the pipeline, if possible (Section 5.2.4). If the pipeline had to be cut open or dismantled, take the sample from the new access port. If access is not available, skip this box.
3.90 Obtain inside surface radiological dose rate measurements with gamma probe.	Collect radiological dose rate measurements from within the pipeline at the same access port used to collect the residue/wipe sample. (Section 5.2.5)
3.91 If pipeline was cut open or dismantled, reassemble (if possible) or grout closed.	To prevent the potential spread of contamination, the pipeline must be secured when all of the sampling activities have been completed. For safety purposes, obtain and secure a lock out/tag out ticket and affix it to the pipeline at its origin.

* Note: Refer to Figure 4-4 for corresponding number reference.

TABLE 4-5
Pipeline Sampling Evaluation Description*
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

SAMPLING APPROACH/DECISION	NARRATIVE
3.92 Return test area to preinvestigative state.	All boreholes, test pits, or hydraulic sample holes must be backfilled with clean fill material or grout. Any asphalt or concrete removed to begin locating or sampling activities must be replaced.
4.00 Would excavation activities conducted along the pipeline to the next test area meet the criteria listed in Table 4-4?	To supplement the pipeline integrity evaluation, provisions will be made to collect soil samples along the pipeline at depths and locations similar to the test area sampling methods. Since this confirmation soil sampling will involve the use of intrusive hydraulic sampling methods, an evaluation of site conditions regarding excavation/sampling activities versus plant security, public health, and worker safety must be made. If any of the criteria listed in Table 4-4 are not met, then the subsurface soil collection task for that portion of the pipeline should be deferred until plant closure.
4.10 Conduct confirmation soil sampling along pipeline.	As illustrated in Figure 4-5, confirmation sample locations will alternate on either side of the pipeline on 20-foot centers (Section 4.3.5.1).
4.11 Collect appropriate soil/groundwater samples.	Where available, subsurface soil and groundwater samples will be collected at the same target depths as illustrated in Figure 5-1.
4.20 Do confirmation sample data indicate exceedance of RFETS Preliminary Remedial Goals for subsurface soils?	If the contaminant concentrations observed during the confirmation sample collection activity exceed the PRGs listed in Appendix F (construction worker subsurface soils), then the confirmation sample areas must be expanded (Figure 4-5).
4.31 Collect appropriate soil/groundwater samples.	If the contaminant concentrations observed during the confirmation sample collection activity exceed the PRGs listed in Appendix F, then the confirmation sample areas must be expanded (Figure 4-5). Where available, subsurface soil and groundwater samples will be collected at the same target depths as illustrated in Figure 5-1.
4.40 Is pipeline a candidate for an early removal action?	If sufficient data that document the extent of contamination exist, or imminent danger exists to the worker or general public safety, then the source material must be removed under an early action removal task. This task is to be performed by RFP's Accelerated Cleanup Team.
4.41 Provide recommendation to RFETS Accelerated Cleanup Team.	All early action removal activities are to be conducted by RFP's Accelerated Cleanup Team.

* Note: Refer to Figure 4-4 for corresponding number reference.

TABLE 4-5
Pipeline Sampling Evaluation Description*
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

SAMPLING APPROACH/DECISION	NARRATIVE
4.50 Is immediate action required to protect worker safety and/or environment?	Did the excavation, drilling, or sampling activity create a safety hazard or an environmental situation requiring immediate action?
4.51 Return to sampling activities.	If no potential problems have been realized through the sample collection activities, return to the point where you left the decision tree and move to the next box.
4.52 Take appropriate actions; notify appropriate RFETS agencies.	Take appropriate actions to remedy any potential safety or environmental problems that may have occurred as a result of subsurface sampling activities. Notify the appropriate authorities of the potential problems and the steps being taken to remedy the situation.
4.53 Can activities resume?	Have the potential problems been resolved and have the appropriate authorities agreed that activities may resume?
4.54 Stop OU9 OPWL sampling activities.	Stop the sampling process until the problem can be resolved and approval is obtained from the appropriate authorities for continuing the sampling activities.
4.55 Upon EG&G concurrence, provide Early Action removal recommendations.	Provide recommendations to RFP Accelerated Cleanup Team regarding an early removal action for the pipeline in question.

Notes:

DQO = data quality objective
OSHA = Occupational Safety and Health Administration
OP = operating procedure
PRG = preliminary remediation goals
RFETS = Rocky Flats Environmental Technology Site

* Note: Refer to Figure 4-4 for corresponding number reference.

TABLE 4-6
Contingency Measures
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

ACTIVITY	POTENTIAL PROBLEM	CONTINGENCY
Locating pipeline	Routine locating techniques are not successful in locating pipeline.	An alternative method is proposed to locate pipeline. If an existing operating procedure does not exist, one must be developed or the line deferred until RFETS closure. This contingency may include procurement of equipment for the proposed method.
Locating pipeline	Pipeline is of different material than originally thought. This affects the type of locating technique and tools that should be used.	Determine an appropriate locating technique that is better suited to the material and proceed with locating the pipeline.
Locating pipeline	Pipeline is not found or does not exist.	Pipeline may have been removed. Sample to determine whether contamination is present. If the pipeline did not exist, it will be considered an invalid designation and deleted from OU9.
Excavation	Soil disturbance permit is not obtainable because of site-specific variables. Excavation is not permitted.	Identify alternative method(s). If an existing operating procedure does not exist, one must be developed. This contingency may include purchase of equipment for the proposed method. If pipeline is not accessible as a result of RFETS activities, its investigation will be deferred until it is inactivated or RFETS is closed.

TABLE 4-6
Contingency Measures
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

ACTIVITY	POTENTIAL PROBLEM	CONTINGENCY
Excavation	Contaminated soil from excavation exceeds action levels.	Stop work. Notify EG&G H&S. Implement engineering controls to preclude migration of contamination as specified in the H&S Plan. Evaluate the need for interim measures/interim remedial action. Proceed when hazard is mitigated and it is safe.
Excavation	Utilities are broken during excavation.	Remove people from hazard. Evaluate the situation. Notify the appropriate RFETS staff as described in the H&S Plan. Deenergize power to electrical lines immediately. Deenergize high pressure gas and/or steam lines. Remove people from hazard. Repair the damage. Proceed when safe.
Excavation	Pipeline can be opened but a large quantity of radiological material is suspected to be present.	Contact EG&G radiological engineering immediately to assess the situation and the need for additional safety equipment. Proceed when safe to do so.
Sampling	Visual contamination or high in situ radiological or in situ chemical contamination is detected.	Collect samples of opportunity to delineate the areal and lateral extent of contamination. This contingency may include the procurement of in situ field instruments.

TABLE 4-6
Contingency Measures
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

ACTIVITY	POTENTIAL PROBLEM	CONTINGENCY
Sampling	Pipeline is full of liquid when opened.	Access pipe from top using small-diameter access hole. Evaluate pipe contents before proceeding. Exercise spill control and containment procedures, if necessary. Evaluate early removal options.

Notes:

H&S = Health and Safety
RFETS = Rocky Flats Environmental Technology Site

TABLE 4-7
Removal Action Criteria
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

CRITERIA	MINIMUM REQUIREMENTS
Health and Safety Issues	An approved Health and Safety Plan for the removal action
	Engineering controls in place to minimize contaminant migration as required by the Plan for Prevention of Contaminant Dispersion (DOE 1992c)
Waste Issues	Approved operating procedures for characterizing, handling, and transportation of the waste
	Feasible disposal/treatment options to receive the waste
Physical Access and Feasibility	Removal action does not damage structures or utilities
	Removal action meets the requirements of the RFETS Operating Procedure for Excavations and Trenching (1-b37-HSP-12.08)
	Removal action does not adversely affect RFETS security, such as blocking access to major roadways in the Protected Area
Administrative Requirements	RFETS IWCP are written and approved
	RFETS permits, such as soil disturbance and land use permits, are in place
	Quality assurance reviews are in place
RCRA/CERCLA	RFETS Preliminary Remediation Goals are set for contaminants of concern in soil medium
	Action levels (maximum contaminant levels) for contaminants of concern in water medium are set
	If contaminated soils are removed (source areas) and contaminated groundwater exists, it will be handled through an existing remedial action
	Source removal supports the final remedial action for the Record of Decision

Notes:

DOE = U.S. Department of Energy
RFETS = Rocky Flats Environmental Technology Site
IWCP = Internal Work Control Packages
RCRA = Resource Conservation and Recovery Act
CERCLA = Comprehensive Environmental Response, Compensation and Liability Act

TABLE 4-8
OPWL Field Investigation Recommendations
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

PIPELINE DESIGNATION	IS PIPELINE ACCESSIBLE TO EXCAVATION ACTIVITIES?	PORTIONS TO BE ADDRESSED AS PART OF OU4?	PART OF CURRENT PROCESS WASTE SYSTEM?	CURRENTLY USED FOR OTHER SERVICES? (1)	HAS PIPELINE BEEN REMOVED?	FIELD INVESTIGATION RECOMMENDATION (2)	COMMENT
P-1	Yes	No	Yes	No	Partially	Defer	Portion of P-1 is incorporated into the new process waste system as permitted RCRA units.
P-2	No	No	No	No	No	Defer	Line is located beneath building.
P-3	Yes	No	No	No	No	Sample	
P-4	Yes	No	No	No	No	Sample	
P-5	Yes/No	No	No	No	No	Locate/Sample	Portions of line located beneath building.
P-6	Yes	No	No	No	No	Sample	
P-7	Yes/No	No	Yes	No	No	Defer	Portion of line located beneath building.
P-9	Yes/No	No	No	No	No	Locate/Sample	Portions of line located beneath buildings; discrepancies in map locations exist.
P-10	Yes	No	No	No	No	Sample	Portions of line located beneath building.
P-11	Yes	No	No	No	No	Sample	
P-12	Yes	No	No	No	No	Locate/Sample	Need to further evaluate mislabeled lines on map.
P-13	Yes	No	No	No	No	Locate/Sample	Need to further evaluate mislabeled lines on map.
P-14	Yes	No	No	No	Partially	Locate/Sample	Some of P-14 may have been removed during construction of buildings; discrepancies in map locations exist.

TABLE 4-8
OPWL Field Investigation Recommendations
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

PIPELINE DESIGNATION	IS PIPELINE ACCESSIBLE TO EXCAVATION ACTIVITIES?	PORTIONS TO BE ADDRESSED AS PART OF OU4?	PART OF CURRENT PROCESS WASTE SYSTEM?	CURRENTLY USED FOR OTHER SERVICES? (1)	HAS PIPELINE BEEN REMOVED?	FIELD INVESTIGATION RECOMMENDATION (2)	COMMENT
P-15	Yes	No	No	No	No	Sample	
P-16	Yes	No	No	No	No	Sample	
P-17	Yes/No	No	No	No	Partially	Sample	Portions of line located beneath building.
P-19	Yes	No	No	No	Partially	Sample	
P-20	Yes	No	No	No	No	Sample	
P-20.1	Yes	No	No	No	No	Locate/Sample	
P-21	Yes	No	No	No	No	Sample	
P-22	Yes/No	No	No	No	Partially	Locate/Sample	Portion of line beneath buildings, some lines removed.
P-23	NA	NA	NA	Yes	NA	Defer	Used as fire plenum deluge for Building 771.
P-24	Yes	No	No	No	No	Sample	
P-25	Yes/No	No	No	No	No	Locate/Sample	Portions of line beneath building.
P-26	Yes	Yes	No	No	No	Sample/Transfer	Sample portions of line within OU9.
P-27	Yes	No	No	No	No	Locate/Sample	Discrepancies in map locations exit.
P-28	Yes	No	No	No	No	Locate/Sample	Discrepancies in map locations exit.
P-29	Yes	No	No	No	No	Locate/Sample	Discrepancies in map locations exit.
P-30	Yes/No	No	No	Yes	No	Locate/Sample	Portion of pipe used for fire plenum deluge for Buildings 776 and 777.

TABLE 4-8
OPWL Field Investigation Recommendations
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

PIPELINE DESIGNATION	IS PIPELINE ACCESSIBLE TO EXCAVATION ACTIVITIES?	PORTIONS TO BE ADDRESSED AS PART OF OU4?	PART OF CURRENT PROCESS WASTE SYSTEM?	CURRENTLY USED FOR OTHER SERVICES? (1)	HAS PIPELINE BEEN REMOVED?	FIELD INVESTIGATION RECOMMENDATION (2)	COMMENT
P-30.1	Yes	No	No	No	No	Locate/Sample	
P-30.2	Yes	No	No	No	No	Locate/Sample	
P-31	No	No	No	No	No	Transfer	Pipeline located in tunnel, transfer to OU8 activities.
P-32	Yes/No	No	No	No	No	Locate/Sample	Portions of line beneath building.
P-33	Yes	No	No	No	Partially	Locate/Sample	Western section was removed for building construction.
P-34	Yes	No	No	No	No	Locate/Sample	
P-34.1	Yes/No	No	No	No	Unknown	Locate/Sample	Portions may have been removed.
P-35	Yes	Yes	No	No	No	Sample/Transfer	Sample portion of line within OU9.
P-36	Yes	Yes	No	No	No	Sample/Transfer	Sample portion of line within OU9.
P-37	Yes	Yes	No	No	No	Locate/Sample/Transfer	Discrepancies in map locations. Sample portion of line within OU9.
P-38	Yes	No	No	No	Unknown	Locate/Sample	Portions of line may have been removed.
P-39	Yes	No	No	No	No	Sample	
P-40	Yes	No	No	No	Partially	Locate/Sample	Aboveground piping has been removed.
P-41	Yes	Yes	No	No	Partially	Sample/Transfer	Portions of line have been removed, some beneath building. Sample portion of line within OU9.

TABLE 4-8
OPWL Field Investigation Recommendations
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

PIPELINE DESIGNATION	IS PIPELINE ACCESSIBLE TO EXCAVATION ACTIVITIES?	PORTIONS TO BE ADDRESSED AS PART OF OU4?	PART OF CURRENT PROCESS WASTE SYSTEM?	CURRENTLY USED FOR OTHER SERVICES? (1)	HAS PIPELINE BEEN REMOVED?	FIELD INVESTIGATION RECOMMENDATION (2)	COMMENT
P-41.1	Yes/No	No	No	No	Unknown	Locate/Sample	Portions of line have been removed, some beneath building.
P-42	Yes/No	No	No	No	No	Locate/Sample	Portions beneath building.
P-43	Yes	No	No	No	No	Sample	Sample portions within OU9.
P-44	Yes	No	No	No	No	Sample	Sample portions within OU9.
P-45	Yes	No	No	No	No	Locate/Sample	
P-46	Yes	Yes	No	No	No	Sample/Transfer	Sample portions of line within OU9.
P-47	NA	Yes	Unknown	No	No	Transfer	Part of OU4.
P-48	NA	Yes	No	No	No	Transfer	Part of OU4.
P-49	NA	Yes	No	No	Unknown	Transfer	Part of OU4.
P-50	NA	Yes	Unknown	No	No	Transfer	Part of OU4.
P-51	No	No	No	No	Partially	Defer	Line located beneath building.
P-52	NA	NA	NA	NA	NA	NA	Not part of OPWL.
P-53	Yes	No	No	No	No	Locate/Sample	Discrepancy in map locations exist.
P-54	Yes/No	No	Yes	No	Partially	Sample/Defer	Some portions removed; others incorporated into the new process waste transfer system as active RCRA permitted units.
P-55	Yes	No	No	No	No	Locate/Sample	
P-57	NA	NA	NA	NA	NA	NA	Line may not exist.

TABLE 4-8
OPWL Field Investigation Recommendations
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

PIPELINE DESIGNATION	IS PIPELINE ACCESSIBLE TO EXCAVATION ACTIVITIES?	PORTIONS TO BE ADDRESSED AS PART OF OU4?	PART OF CURRENT PROCESS WASTE SYSTEM?	CURRENTLY USED FOR OTHER SERVICES? (1)	HAS PIPELINE BEEN REMOVED?	FIELD INVESTIGATION RECOMMENDATION (2)	COMMENT
P-58	Yes	No	No	No	Unknown	Locate/Sample	Portions may have been removed.
P-59	Yes	No	No	No	Unknown	Locate/Sample	Portions may have been removed.
P-60	Yes	No	No	No	Yes	Locate/Sample	Confirm removal of pipeline.
P-61	Yes	No	No	No	No	Sample	
P-63	Yes/No	No	No	No	Portions	Locate/Sample	Portions of pipeline located in tunnel.
P-64	Yes/No	No	No	No	No	Locate/Sample	Portions of pipeline located beneath building.
P-65	Yes	No	No	No	No	Locate/Sample	
P-66	Yes/No	No	No	No	No	Locate/Sample	Portions of pipeline located beneath building.

Note:

(1) Including fire plenum lines.

(2) TRANSFER: Transfer responsibility to adjacent OUs or Early Action Agency at RFP.
DEFER: Defer further investigation of the portion of pipeline that is still in use or inaccessible.
LOCATE: Conduct pipeline locating evaluation (Figure 4-3).
SAMPLE: Initiate pipeline sample method evaluation (Figure 4-4).

Yes/No = Portions of line are accessible; others are not.
NA = Not Applicable

FIGURE 4-1
OU9 FIELD INVESTIGATION CONCEPTUAL APPROACH
OU9 ORIGINAL PROCESS WASTE LINES
ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE, COLORADO

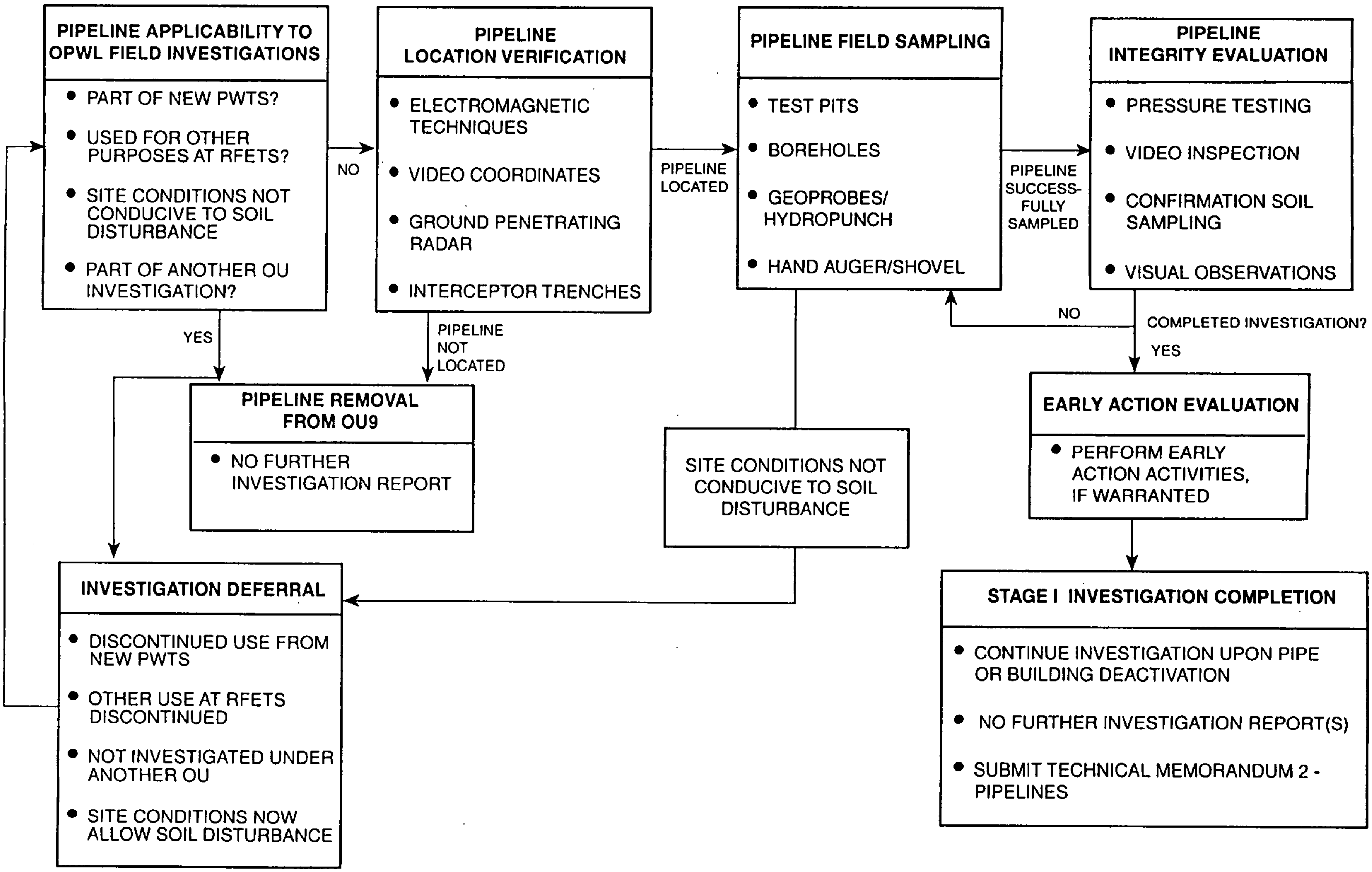
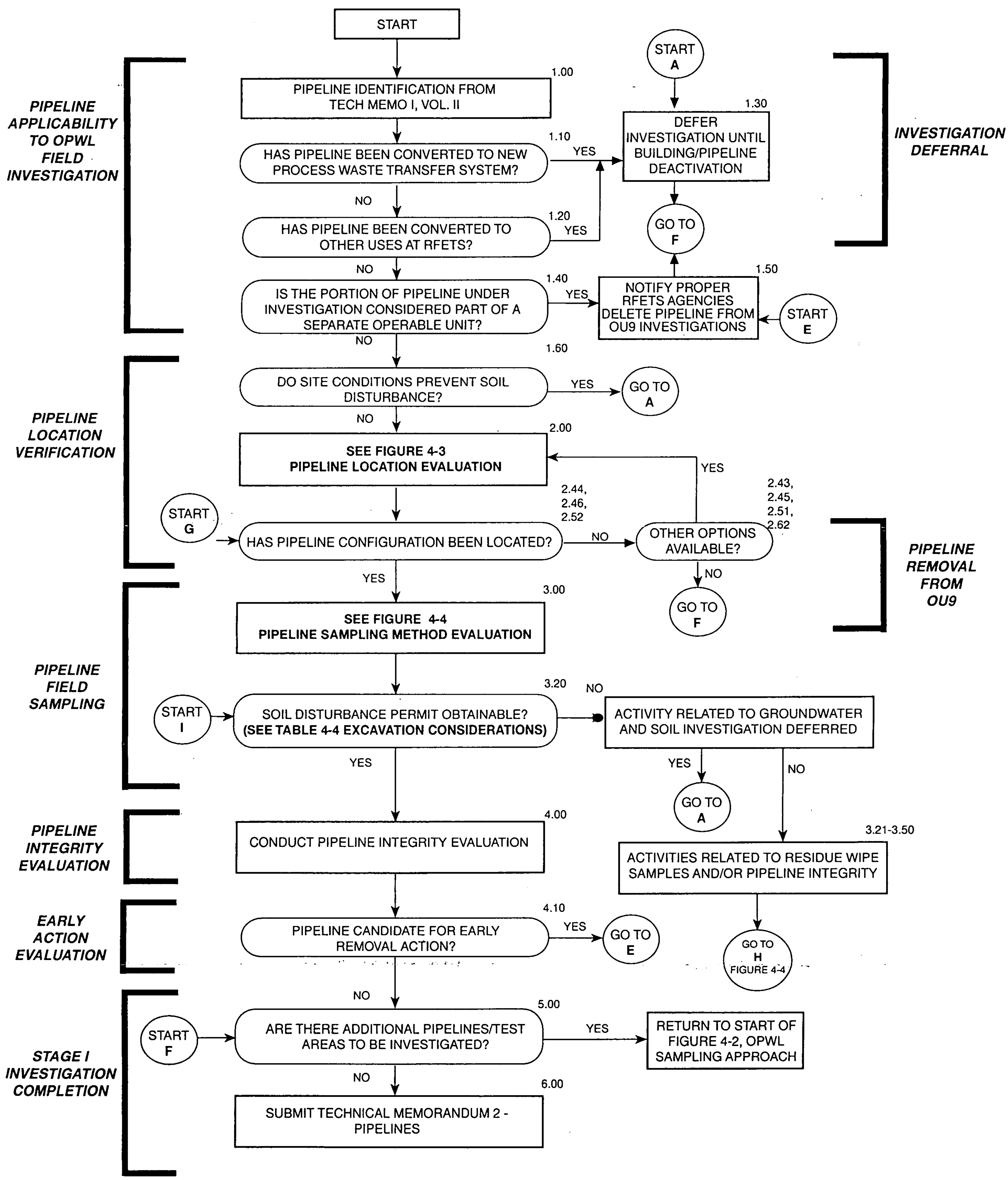


FIGURE 4-2
CONCEPTUAL OU9 FIELD SAMPLING APPROACH
OU9 ORIGINAL PROCESS WASTE LINES
ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE, COLORADO



NOTE: FOR NUMBER REFERENCE, REFER TO TABLE 4-2

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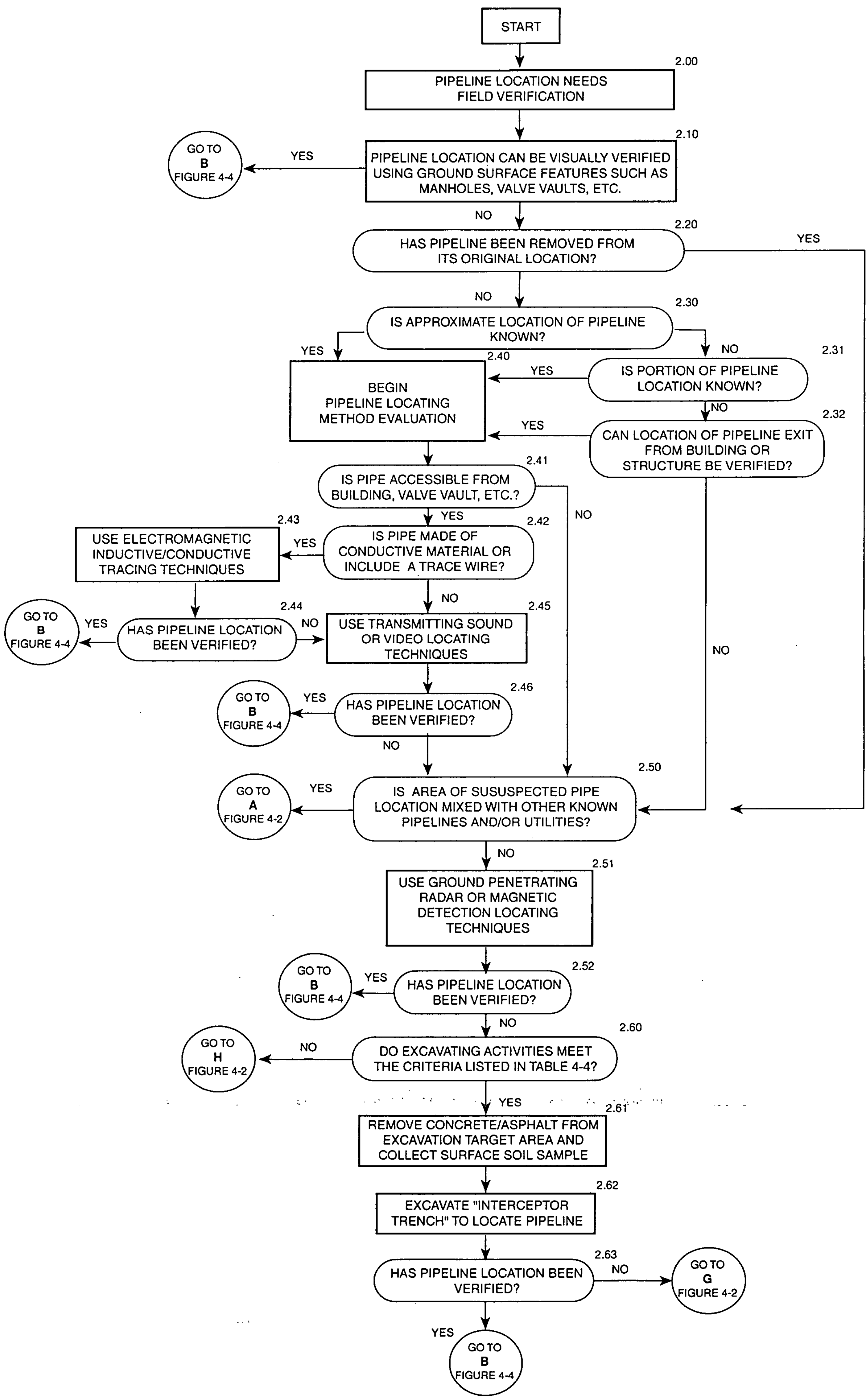
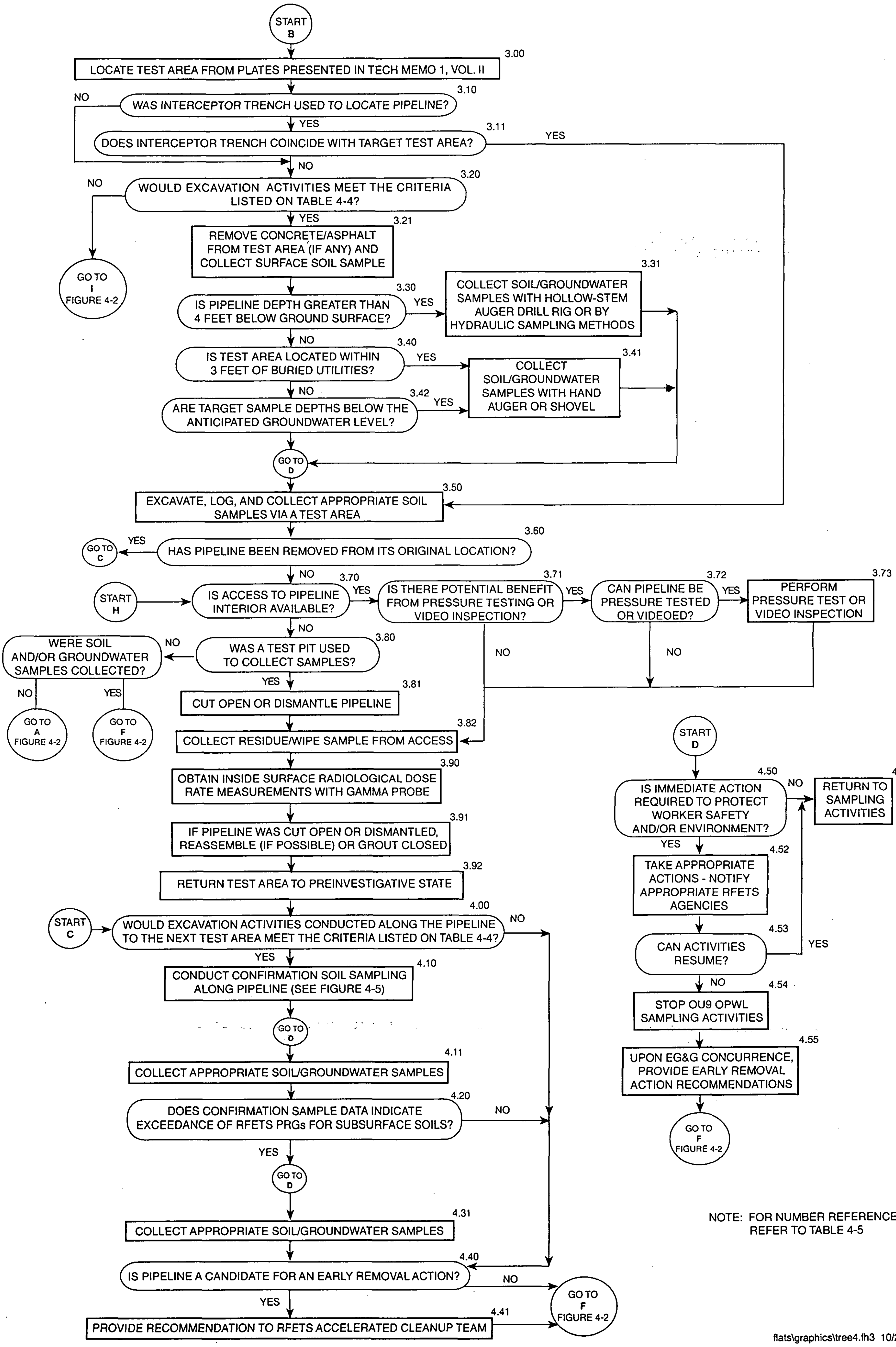
FIGURE 4-3
OU9 PIPELINE LOCATION EVALUATION
OU9 ORIGINAL PROCESS WASTE LINES
ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE, COLORADO



NOTE: FOR NUMBER REFERENCE, REFER TO TABLE 4-3

FIGURE 4-4
OU9 PIPELINE SAMPLING METHOD EVALUATION
OU9 ORIGINAL PROCESS WASTE LINES
ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE, COLORADO



NOTE: FOR NUMBER REFERENCE, REFER TO TABLE 4-5

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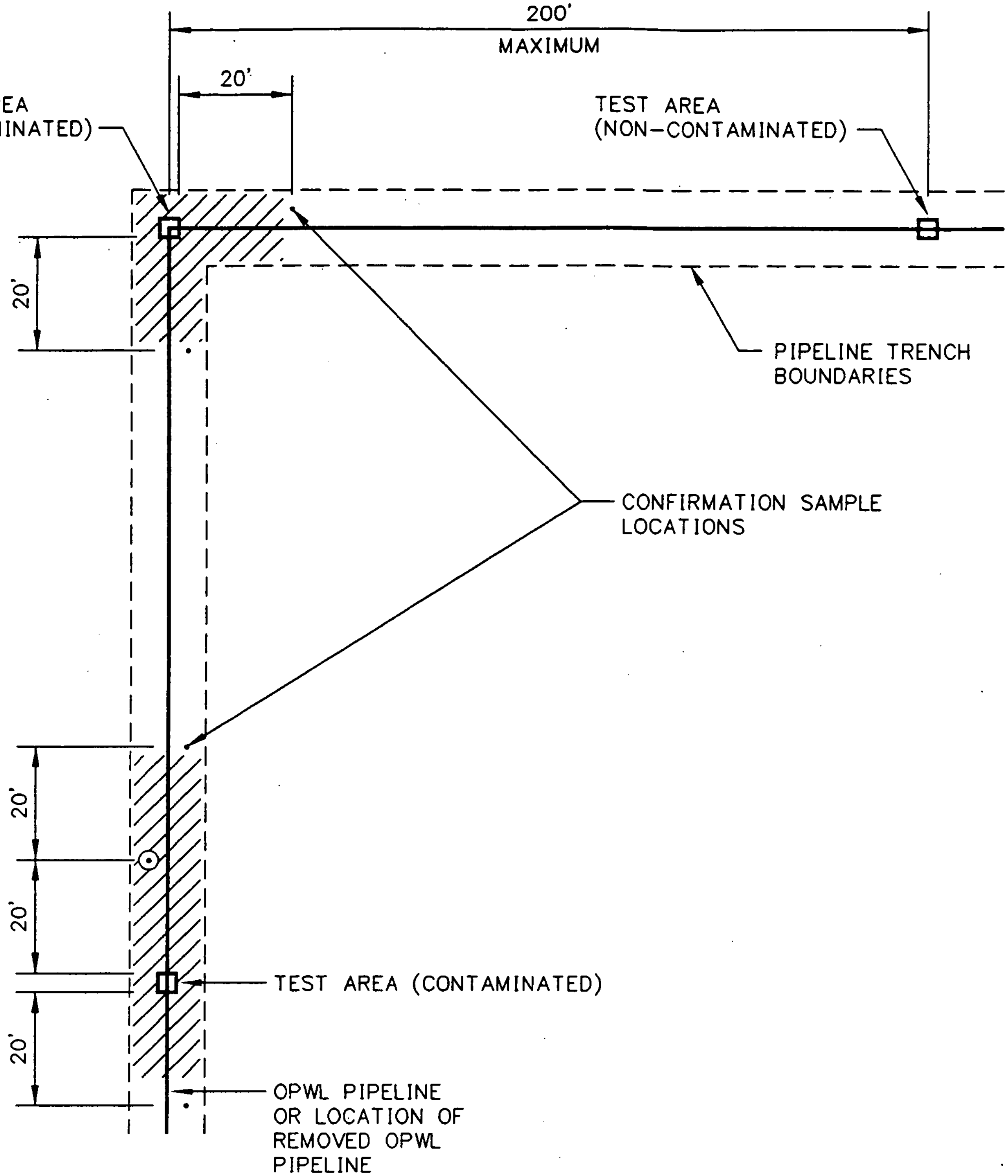


NOTE: NOT TO SCALE

LEGEND

- ⊙ Sample concentrations exceed soil PRG's
- • Additional confirmation sample locations
- Contaminated Area

FIGURE 4-5

PIPELINE INTEGRITY CONFIRMATION SAMPLE LOCATIONS

OPERABLE UNIT 9
ORIGINAL PROCESS WASTE LINES
TECHNICAL MEMORANDUM 1, VOLUME II

EG&G ROCKY FLATS

Rocky Flats Environmental
Technology Site
P.O. Box 464
Golden, Colorado 80402-0464

5.0 FIELD PROCEDURES

This section provides guidance for the conduct of field operations under the proposed RFI/RI program at OU9. A discussion of the sampling and analysis rationale for this program has been presented in Section 4.0 of this memorandum. Site-specific analytical requirements are presented in Section 6.0. All field activities for OPWL pipelines will be conducted in accordance with the RFET operating procedures (OPs) outlined in the Environmental Management Division (EMD) OP FO.28, *Tank and Pipeline Investigation* (EG&G latest version). In addition, all field activities must be conducted in accordance with the most current version of the Integrated OUs project *Health and Safety Plan* (DOE 1993b). Health and safety protocols for actions such as confined space entry, heavy equipment operation, excavation and trenching, shoring, radiation monitoring, and air monitoring are addressed in the *Health and Safety Plan* (DOE 1993b).

For discussion purposes, field methodologies to be used under the OPWL pipeline investigation have been divided into the following four categories:

- Field Operations;
- Test Area Sampling;
- Sample Handling and Record Keeping; and
- Data Management and Reporting.

A summary of the specific field methods to be used, by category, is provided in the following sections. Additional details of the methods can be found in the referenced RFET OPs. In addition, Table 5-1 has been included to provide a summary of RFET EMD OPs applicable to the proposed OPWL sampling activities.

5.1 FIELD OPERATIONS

This section of the report provides a brief summary of field activities excluding test area sampling. Test area sampling activities are discussed in Section 5.2, sample handling and record keeping are addressed in Section 5.3, and data management is discussed in Section 5.4.

5.1.1 Visual Inspections and Site Walks

Visual inspections and site walks (VI/SW) will be performed before field activities begin. Results of the VI/SWs will help identify the following: test area locations; OPWL component locations and interconnections; locations of structural features such as overhead or underground piping and utilities, valves, cleanouts, and manholes; locations of pipeline connections to buildings; areas where construction activities may have damaged OPWL components; and logistical problems associated with field sampling activities such as security requirements and heavy equipment access restrictions.

5.1.2 Surface Radiological Surveys

As part of the OPWL field activities, a surface radiation survey will be conducted throughout OU9 using a HPGe detector to assess the potential for radioactive contamination in surface soils. The HPGe instrument is a semiconductor radiation detector that measures in situ low-energy x-ray and gamma-ray emitting radionuclides in soil. The HPGe detector has a broad energy range, the ability to identify all gamma-emitting radionuclides, and exhibits high resolution. The survey detects concentrations of gamma-emitting radionuclides including but not limited to potassium-40; radium-226; thorium-232; cesium-137; americium-241; plutonium-239, -240, and -241; and uranium-233, -234, and -235. The HPGe surveys are conducted according to EMD OP GT.30, *Insitu Characterization for Radionuclides* (EG&G latest version). The HPGe results for these areas will be used to locate "hot spots" to guide subsequent NaI radiological surveys that may be used to identify additional test areas for the OPWL field investigation.

In areas where the HPGe survey indicates elevated radiological concentrations, an NaI survey will be conducted to further delineate the area of contamination. The NaI scintillation detector, also referred to as a FIDLER, is used for detecting low energy gamma and x-rays. The detector consists of a single crystal of sodium iodide to which a small amount of thallium has been added. The detector has a narrow field of view of approximately 1 foot in diameter when held 2 inches above the ground. This instrument is designed to measure low-energy gamma-rays and x-rays that are characteristic of americium and plutonium. The procedure for use of the FIDLER (EMD OP FO.16, *Field Radiological Measurements*) (EG&G latest version) requires establishing a background reading. NaI surveys will be conducted at areas in OU9 where elevated radiological concentrations are detected by the HPGe survey by using a rectangular grid that covers the approximate area of the valve vault or pipe alignment. Radiological survey points will be surveyed with the use of a global positioning system (GPS) in accordance with EMD OP GT.27, *Autonomous Operation of Global Positioning Equipment* (EG&G latest edition).

5.1.3 Permitting and Utility Clearance

Before any excavation or soil disturbance activities, proper utility clearance activities must be completed and a Soil Disturbance Permit must be obtained. Utility clearance may consist of activities such as the marking of underground utilities and the deenergizing of high voltage electrical and high pressure gas or steam lines, if applicable. All permitting and utility clearance activities will be performed in accordance with procedures contained in EMD OP GT.10, *Borehole Clearing* (EG&G latest edition) and RFETS procedure 1-B37-HSP-12.08, *Excavations and Trenching* (EG&G 1993a).

5.1.4 Surveying

The locations of all test areas will be paced and taped off before sampling or drilling. After excavation activities have been completed, all drilling and sampling locations will be surveyed with the use of a GPS in accordance with EMD OP GT.27, *Autonomous Operation of Global Positioning Equipment* (EG&G latest edition).

5.1.5 Pipeline Location and Tracing

In general, it is expected that pipeline structural features (e.g., manholes, valve vaults) will allow pipeline alignments to be traced accurately enough to allow location of test areas along the alignment. However, where no structural features exist or are widely spaced, alternate pipeline-location methodologies and devices may be necessary to trace the pipeline. When specific procedures for performing pipeline location and tracing are not covered under approved EMD OPs, Standard Operating Procedures (SOPs) will be developed and submitted before the initiation of fieldwork by the contractor(s) who has been selected to perform the service. These procedures will then be modified as necessary to support the objectives of the OU9 RFI/RI and to conform with project-specific health and safety or environmental protection requirements. The following sections present examples of these alternative methods.

<u>Magnetic Locator</u>. A dual-mode magnetic and cable locator (Schoenstedt MAC-51B) designed for locating buried iron and steel objects and tracing underground cables will be used to help locate OPWL pipelines, when needed. The locator will be used in the magnetic mode and will be operated in accordance with the manufacturer's instruction manuals. All activities will be in accordance with EMD OP GT.18, *Surface Geophysical Surveys* (EG&G latest version). Materials such as vitrified clay may not, however, be conducive to this type of survey.

Electromagnetic Inductive/Conductive Tracing Techniques. Conductive (i.e., metal) pipes can be readily located by attaching a transmitter to the outer surface of the pipe. A signal is then produced and is sent along the pipeline. This signal can be traced by a detector at the surface. For nonconductive pipes, a flexible steel tape or similar conductive material may be inserted into an opening in the pipe and fed down the pipeline. A signal is then sent down the tape and is picked up by a detector at the ground surface. Specific procedures for performing these techniques will be developed by the chosen subcontractor(s) and must be approved before field activities start.

Transmitting Sounde Techniques. A transmitting sounde may be inserted into an opening in the pipe and moved down the pipeline with push rods or a steel tape that can be traced by a detector at the surface. Specific procedures for performing these techniques will be developed by the chosen subcontractor(s) and must be approved before field activities begin.

Ground-Penetrating Radar (GPR). The GPR transmits electromagnetic pulses into the ground from an antenna near the surface. These pulses are reflected back to a receiver from a variety of subsurface interfaces. As the antenna is moved along a survey line, the GPR signals are processed and displayed on a graphic recorder. The display data are two-dimensional continuous profiles along the surveyed line and depict time versus distance.

The GPR resolution of subsurface features is excellent when favorable conditions exist and is readily applicable for use in detecting underground pipelines. However, actual depth penetration is highly site-specific and dependent on near-surface soil conductivity. Highly conductive soils, such as clays, can reduce penetration to less than 3 feet. Less conductive materials, such as clean well-sorted sandstone, will allow penetration to as deep as 30 feet. Operation of GPR will be consistent with the manufacturer's instruction manual, and all procedures will be in accordance with EMD OP GT.18, *Surface Geophysical Surveys* (EG&G latest version).

Video Inspection. Video inspection of pipeline interiors may be useful in tracing pipeline alignments by providing azimuth and range data and may also aid in evaluating the integrity of the pipeline. It can be performed on pipelines as small as 3 inches in diameter. Video inspection is performed using a remote camera and closed-circuit television. All video activities will be conducted in accordance with RFETS procedure 21000-SUI-SW.01, *Video Inspection of Pipelines* (EG&G 1993b).

Interceptor Trenches. Interceptor trenches will be used only when all other available locating techniques have failed. Interceptor trenches can be dug in areas where the location of the pipeline is approximate. After the pipeline is located, the alignment of the pipeline can be verified and further locations approximated. Interceptor trenches may be used for locating and tracing vitrified-clay pipelines, which may not be conducive to other means of locating. All trenches will be excavated in accordance with EMD OP GT.7, *Logging and Sampling of Test Pits and Trenches* (EG&G latest version).

5.1.6 Sampling Equipment

Before sampling, the following equipment must be obtained as required by EMD OP FO.13, *Containerization, Preserving, Handling, and Shipping of Soil and Water Samples* (EG&G latest version). Examples of equipment specified in OP FO.13 include sample glassware with preservative (as described in Section 6.0), coolers, thermometer, blue ice, sample labels, chain-of-custody forms, custody seals, zip-lock bags, bubble wrap, vermiculite, strapping tape, clear tape, and a carboy to transport rinsate water.

5.1.7 Field Communications

A proper communication system for field personnel must be established before sampling for emergency notification and response. Communications in the field are to be established and operated in accordance with EMD OP FO.11, *Field Communications* (EG&G latest version).

5.1.8 Test Pit Excavation and Logging

Test pit excavation is one of the options for conducting test area sampling activities presented in Section 4.0. In the event that this method is selected, test pits will be excavated and logged in accordance with EMD OP GT.7, *Logging and Sampling of Test Pits and Trenches and Construction Excavations* (EG&G latest version) and RFETS procedure 1-B37-HSP-12.08, *Excavations and Trenching* (EG&G 1993a). As specified in OP GT.7, all excavations that are deeper than 4 feet will be examined daily by the designated "Excavation Competent Person" and measures will be taken to comply with OSHA regulations before personnel entry.

If test pit excavation is the option selected for pipeline sampling, excavation will begin after collection of a surface soil sample at the test pit location and after removal of any pavement or other surface cover, as necessary. Test pit excavation will be performed in a manner that does not damage in situ conditions of the pipelines. Mechanized digging equipment (e.g., backhoes) will be used to remove only the bulk of the material covering the pipeline. Periodic manual probing may be necessary to measure the depth of the remaining cover. Once a depth of cover of less than 1 foot remains, test pit excavation will be completed with shovels. Information gathered to complete excavation permitting procedures, as described in EMD OP GT.10, *Borehole Clearing* (EG&G latest version), will help in planning the excavation by identifying potential interferences (e.g., nearby underground utilities).

The test pit and pipeline will be photographed and sketched in accordance with EMD OP GT.7, *Logging and Sampling of Test Pits and Trenches* (EG&G latest edition). Any evidence of pipeline degradation will be described in detail. The location and invert elevation of the pipe will be surveyed and the visible contamination, extent of trench backfill, and type of backfill material of the soils exposed in the excavations will be described.

5.1.9 Subsurface Drilling and Logging

Field procedures and required equipment for soil borings are specified in EMD OP GT.02, *Drilling and Sampling Using Hollow-Stem Auger Techniques* (EG&G latest version). Before drilling, the location will be cleared for utilities in accordance with EMD OP GT.10, *Borehole Clearing* (EG&G latest version). It is anticipated that soil borings will be drilled along the pipeline alignments and both trench-fill material and native soil underlying the trench will be sampled. Where drilling rig access is restricted (e.g., a building or security fence), the borings will be drilled as close as possible to the originally planned location. In such instances, it may be possible to drill the borings with a hand auger, depending on the depth required.

A complete lithologic log of conditions encountered during drilling will be maintained in accordance with EMD OP GT.1, *Logging of Alluvial and Bedrock Material* (EG&G latest version). After completion of drilling and sampling, boreholes will be plugged and abandoned following EMD OP GT.5, *Plugging and Abandonment of Boreholes* (EG&G latest version).

5.1.10 Hydraulic Sampling Methods

Subsurface-soil samples may also be collected through the use of hydraulic sampling methods. An example of this type of sampling method, using a Geoprobe® Model 8-M truck-mounted hydraulic ram is presented below. SOPs for this particular method have been developed as part of the soil-gas sampling conducted under the current IOU field sampling program (EG&G 1994c).

The proposed Geoprobe® method would use a dynamic subsurface-soil sampling procedure involving the use of a 2-inch diameter by 24-inch long stainless-steel lined California core barrel. A Geoprobe® Model 8-M truck-mounted hydraulic ram drives the core barrel to prescribed sampling depths. The weight of the truck and the hydraulic ram can be applied when driving the barrel, enabling it to be driven to the prescribed depths.

Because specific procedures covering this type of activity are not yet covered under approved EMD OPs, SOPs will be developed and submitted by the contractor(s) selected to perform the service before the initiation of fieldwork. These procedures will then be modified as necessary to support the objectives of the OU9 RFI/RI and to conform with project-specific health and safety or environmental protection requirements.

Before any intrusive work involving the geoprobe, permitting and utility clearance activities will be completed in accordance with EMD OP GT.10, *Borehole Clearing* EG&G latest version. After completion of sampling, the hole generated by the geoprobe will be backfilled with native soil or a bentonite slurry.

5.1.11 Pipeline Inspection

In accordance with the *OU9 Phase I RFI/RI Work Plan* (DOE 1992a), where accessible, pipelines and other ancillary structures are to be visually inspected to determine the physical condition of these structures and the presence of residual products or waste materials. However, it is anticipated that only a small percentage of the total pipeline system will be visually inspected by using test pits. Therefore, to more fully evaluate the current status of the pipeline integrity, additional methods of inspection such as remote video inspections and pressure testing may be performed, where feasible. As discussed in Section 4.0, geoprobe soil sampling will also be performed to confirm the results of the integrity tests. With the exception of geoprobe sampling, these additional methods of inspection are discussed in the following sections.

<u>Visual Inspection of Pipelines</u>. After test pits have been excavated and the external surface of a pipeline exposed and if no groundwater is present, an inspection of the pipeline surface

will be performed. Visual inspections will be performed in accordance with EMD OP FO.28, *Tank and Pipeline Investigation for RCRA Facility Investigation/Remedial Investigation* (EG&G latest version). Inspections will also be conducted on aboveground pipes and pipes located in valve vaults. If the pipeline is shielded by insulation, the insulation will be examined (without disturbing the material) for visual evidence of leaks. The condition of the pipe material, if exposed, will be described and documented in the field book and on a field data sheet. Information noted should include the following items:

- stained soils;
- scoured soils from fluid flow;
- signs of settlement or pooling;
- description of surrounding vegetation (if any);
- cracks, holes, bubbling, corrosion, or other signs of material fatigue or failure;
- welding fatigue or failure, such as cracks, pinholes, or seeps;
- defective bell and spigot joints (including missing or deteriorated gaskets);
- measurement of pipe wall thickness;
- cracks, holes, bubbles, or other drainage pathways within secondary containment (liner or berm);

- damages, leakage, and signs of tampering within pressure release devices; and

- bright metal (e.g., copper pipe) indicating electrolytic activity with the piping as the anode (scavenged source).

Video Inspection. Video inspection of pipeline interiors presents another method for evaluating pipeline integrity. In particular, video inspection may aid in evaluating leaks detected through pipeline pressure testing and in evaluating pipelines that are not conducive to pressure testing (e.g., vitrified-clay pipelines). Video inspection, which can be performed on pipelines as small as 3 inches in diameter, are performed using a remote camera and closed-circuit television. All activities will be conducted in accordance with RFETS procedure 21000-SUI-SW.01, *Video Inspection of Pipelines* (EG&G 1993b), and EMD OP FO.28, *Tank and Pipeline Investigation for RCRA Facility Investigation/Remedial Investigation* (EG&G latest version).

Pressure Testing. Pipeline pressure testing will be used where feasible to aid in detecting release locations in unexcavated portions of the pipelines and in confirming the integrity of pipelines that appear sound as noted by visual inspections. Where successfully performed, the testing will provide an additional measure of assurance that sections of the pipeline that are not visually inspected have been evaluated. Pressure testing is anticipated to be performed on pipeline segments between available access points (test pits, manholes, valve vaults, etc.) where possible. However, testing will not be performed where potential access points are below the water table.

Pipeline pressure testing is performed by pressurizing a length of the pipeline to a pressure equivalent to the pressure exerted when the pipeline is in operation or a pressure based on the pipe material or construction. A quantified pressure drop indicates a possible leak in the pipe length being tested. Specific procedures for conducting the pressure testing will be provided by the subcontractor(s) selected to perform the testing. These procedures will then be modified as necessary to support the objectives of the OPWL investigation.

5.1.12 Equipment Decontamination

Before and after any excavation, drilling, or sampling activities, all equipment must be decontaminated in accordance with the procedures outlined in the EMD OPs FO.03, *General Equipment Decontamination*, and FO.04, *Heavy Equipment Decontamination* (EG&G latest versions). As specified in EMD OP FO.03, *General Equipment Decontamination* (EG&G latest version), the following equipment must be assembled for field use: liquinox, bristle brushes (all plastic), RFETS tap water or distilled water, nonreactive plastic wrap, plastic wrap, wash tubs, plastic sheeting for use as ground cover, and paper towels. Disposal of decontamination water shall be in accordance with EMD OP FO.07, *Handling of Decontamination Water and Waste Water* (EG&G latest version).

5.1.13 Waste Disposal

All drill cuttings, soil samples, and water samples will be monitored for organic vapors and radionuclides in accordance with EMD OPs FO.15, *Photoionization Detectors (PIDs) Flame Ionization Detectors* and FO.16, *Field Radiological Measurements* (EG&G latest version), respectively. These procedures are to be described in an upcoming addendum to the Integrated OUs *Health and Safety Plan* (DOE 1993b). Investigation-derived waste such as drill cuttings, soil samples, and water samples will be handled according to guidelines in EMD OPs FO.08, *Handling of Drilling Fluids and Cuttings*, FO.23, *Management of Soil and Sediment Investigation Derived Material (IDM)* and FO.09, *Handling of Residual Samples* (EG&G latest versions). Disposal of personal protective equipment will be in accordance with EMD OP FO.06, *Handling of Personal Protective Equipment* (EG&G latest version). Disposal of decontamination water shall be in accordance with EMD OP FO.07, *Handling of Decontamination Water and Waste Water* (EG&G latest version). Investigative-derived soils generated from test pit excavations will be placed back into their original test pits. The backfilling of test pits will be consistent with the proposed procedures used for backfilling test pits associated with the OU10 IHSS No. 129 Building 443 tank investigations.

5.2 TEST AREA SAMPLING

Sampling activities for the OPWL field investigation are designed to detect points of contamination associated with the OPWL pipelines and to provide an assessment of the nature of contamination at these locations. Samples of any remaining pipeline inventory, trench backfill materials, and native soils will be collected during this investigation along with groundwater grab samples whenever groundwater is encountered. Specific sampling procedures for these media are provided in the following sections. Cross-sectional drawings showing the different types of sampling to be performed are presented in Figure 5-1. Sample volumes for the test area samples described in this section are designed to satisfy the analytical requirements described in Section 6.0.

5.2.1 Surface-Soil Sampling

A surface-soil sample will be collected from each test pit, borehole, and geoprobe sampling location before intrusive work begins. The sample will be taken from an area as close as possible to the center of the test area to be investigated. Surface-soil samples will be collected in accordance with the grab sample method described in EMD OPs GT.08, *Surface Soil Sampling* (EG&G latest version). This grab method is readily applicable to discrete sampling at a single location consisting of a small area. Overlying pavement or other surface cover will be removed if necessary. Each sample will consist of a 6-inch square sampled to a depth of 6 inches.

5.2.2 Subsurface-soil Sampling

Subsurface-soil samples will be collected to provide information on vertical extent and nature of contamination. Subsurface-soil sampling will be performed using either a hollow-stem auger drilling method, a Geoprobe® coring method, or test pit excavation. Descriptions of these three methods are presented in the following sections.

Hollow-Stem Auger Sampling. All subsurface-soil samples will be sampled in accordance with EMD OP GT.02, *Drilling and Sampling Using Hollow-Stem Auger Techniques* (EG&G latest version), using the continuous-core auger method. A 3-inch inside diameter sample barrel will be used to collect 2-foot long samples from the boring. Figure 5-1 illustrates the soil boring sampling locations for OU9 test areas. As shown in the figure, soil samples will be collected at each of the following locations:

- From the ground surface before drilling as discussed in Section 5.2.1, Surface-soil Sampling.

- In the trench backfill near the bottom of the pipeline trench. If groundwater is encountered in the trench backfill, a sample will be collected from the sample barrel directly above the water table. In this scenario, the boring will be terminated and no further soil sampling will occur.

- In the native soil directly below the trench.

- In the native soil mid-depth between the trench bottom and the water table or bedrock, whichever is encountered first.

- In the native soil directly above the water table or directly above the bedrock/alluvium interface, whichever is encountered first.

If the depth between the trench bottom and the water table or bedrock is less than 5 feet, the mid-depth soil sample will be omitted.

Hydraulic Grab Sampling. Subsurface-soil samples may also be collected using hydraulic grab sampling techniques. One possible example of this type of sample method uses a Geoprobe® Model 8-M truck-mounted hydraulic ram. The Geoprobe® method involves a dynamic subsurface-soil sampling procedure using a 2-inch diameter by 24-inch long stainless-steel-lined California core barrel.

This subsurface-soil sampling will be conducted as prescribed in SOPs to be developed and submitted by the contractor(s) selected to perform the service. Before the initiation of fieldwork, these procedures will be modified as necessary to support the objectives of the OU9 RFI/RI and to conform with project-specific health and safety or environmental protection requirements.

Figure 5-1 illustrates the hydraulic grab soil sampling locations for OU9 test areas. The sample collection interval will be the same as previously identified in Section 5.2.2, Hollow-Stem Auger Sampling.

Test Pit Sampling. Test pits will be excavated and sampled in accordance with EMD OP GT.7, *Logging and Sampling of Test Pits and Trenches* (EG&G latest version). Figure 5-1 illustrates the test pit soil sampling locations for OU9 test areas. As shown in the figure, test pit samples will be collected at each of the following locations:

- From the ground surface before drilling, as discussed in Section 5.2.1, Surface-Soil Sampling.
- In the trench backfill near the bottom of the pipeline trench. If groundwater is encountered in the trench backfill, a sample will be collected directly above the water

table using grab sample techniques. In this scenario, the excavation would be terminated and no further soil sampling would occur.

- In the native soil directly below the trench.

5.2.3 Groundwater Sampling

Whenever groundwater is encountered during this investigation, groundwater grab samples will be collected. Analytical results from these samples may provide preliminary information on groundwater contamination near the pipelines. Groundwater samples will be collected either from test pit excavations, soil borings, or Geoprobe® corings that have penetrated the water table. Test pit excavations will not be allowed to go beyond the water table; however, a groundwater sample will be collected whenever possible. Descriptions of these sampling methods are presented in the following sections.

Test Pit Sampling. Any groundwater encountered in a test pit will be sampled as a grab sample in accordance with EMD OP SW.3, *Surface Water Sampling* (EG&G latest version). Field parameters (i.e., temperature, pH, and specific conductance) will be collected as described in EMD OPs SW.2, *Field Measurements of Surface Water Field Parameters* (EG&G latest version). The depth at which groundwater is encountered will also be recorded.

Groundwater Sampling Using Hydraulic Sampling Techniques. Hydraulic sampling techniques may be used to collect groundwater samples at or near the groundwater surface. These samples may then be used to obtain physical, chemical, and radiological data. One possible example of this type of sampling technique involves the use of a HydroPunch® II. This method uses a 48-inch screen insert that is advanced to the desired depth and withdrawn (or opened) up to 48 inches. The HydroPunch® could be advanced either through a borehole generated from a hollow-stem auger or pushed to the desired depth using a Geoprobe®.

After groundwater enters the HydroPunch® II, a grab sample is collected using either a bailer or a peristaltic pump. If groundwater grab sampling is conducted using a HydroPunch®, the sampling activities will be performed as described in EMD OP GW.6, *Groundwater Sampling* (EG&G latest version).

5.2.4 Residue/Wipe Samples

In accordance with the *OU9 Phase I RFI/RI Work Plan* (DOE 1992a), pipelines will be inspected for remaining inventory and, if possible, a residue sample will be collected to characterize the past contents and use of the pipeline. Valves, cleanouts, manholes, and other pipeline openings are the preferred locations for collection of residue samples. Residue samples can also be collected at test area exposures where the pipe can either be cut open or dismantled. Pipelines with high radiation readings or potentially explosive environments will not be cut open. In addition, no attempt will be made to open pipelines and collect residue or wipe samples if groundwater is encountered. If no residue is present, one wipe sample will be collected from the interior surfaces of the pipeline components.

Residue samples will be collected in accordance with EMD OP FO.28, *Tank and Pipeline Investigation for RCRA Facility Investigation/Remedial Investigation* (EG&G latest version) and wipe samples will be collected and tested using EMD OP FO.16, *Field Radiological Measurements* (EG&G latest version). Hazardous waste generated during the pipeline opening and/or sampling will be handled in accordance with the procedures outlined in EMD OPs FO.08, *Handling of Drilling Fluids and Cuttings*, and FO.28, *Tank and Pipeline Investigation for RCRA Field Investigation/Remedial Investigation* (EG&G latest version). Pipe sections that are dismantled will be reassembled if possible or will be grouted closed with a plug of non-shrinking bentonite slurry.

5.2.5 Dose Rate Measurements

In addition to the samples described, inside radiological dose rate measurements will be obtained by inserting a gamma radiation detector into the pipeline. Valves, cleanouts, manholes, and other pipeline openings will be the preferred locations for collection of these measurements. Where other access is not available, the pipe will either be cut open or dismantled at test area exposures. All radiological measurements will be obtained in accordance with EMD OP FO.16, *Field Radiological Measurements* (EG&G latest version).

5.3 SAMPLE HANDLING AND RECORD KEEPING

This section summarizes the sample handling, labeling, and documentation techniques to be used during the OPWL field investigation.

5.3.1 Sample Designations

All sample designations generated for the OU9 RFI/RI will conform to the input requirements of the Rocky Flats Environmental Database System (RFEDS). Each sample collected during the investigation will be designated with a nine-character sample number consisting of a two-letter prefix that relates to the type of sample media collected (e.g., SS for surface-soil) followed by a unique five-digit number and a two-letter suffix identifying the contractor. The EG&G Project Manager will request a project identification (ID) prefix and block of sample numbers. One sample number will be required for each sample generated, including quality control (QC) samples. Using this system, 99,999 sample numbers are available for each sample medium for each contractor. The following type of information will be contained in the sample number:

Character(s)	Description	Example
1 and 2	Sample Media	SS(Surface-soil)
3 through 7	Sample Number	00001 to 99999
8 and 9	Subcontractor ID	JE (Jacobs Engineering)

Sample numbers are assigned on a daily basis by the sample manager. Numbers are assigned consecutively, beginning with 00001.

5.3.2 Documentation

All sampling activities will be documented in a field book and on forms. As specified in EMD OP FO.13, *Containerization, Preserving, Handling and Shipping of Soil and Water Samples* (EG&G latest version), documentation will include the following: sampling activity name and number, sampling point name and number, sample number, name(s) of collector(s) and others present, date and time of sample collection, sample container/tag number (if appropriate), preservative(s), requested analyses, sample matrix, filtered or unfiltered, designation of QC samples, collection methods, chain-of-custody control numbers, field observations and measurements during sampling, and signature. Procedures for monitoring field QC are discussed in Section 6.0.

Transmittal of quality assurance (QA) records will be handled in accordance with EMD OP FO.02, *Transmittal of Field QA Records* (EG&G latest version).

5.3.3 Sample Containers, Preservation, and Sample Shipping

Sample volume requirements, preservation techniques, holding times, and container material requirements are dictated by the media being sampled and the analyses to be performed. Analytical parameters of interest in OU9 for residue, wipe, soil, and groundwater samples and associated container size, preservatives (chemical and/or temperature), and holding times are described in Section 6.0, Sample Analysis. Additional specific guidance on the appropriate use of containers and preservatives is provided in EMD OP FO.13, *Containerization, Preserving, Handling, and Shipping of Soil and Water Samples* (EG&G latest version).

Samples will also be processed for shipment in accordance with EMD OPs FO.13 (EG&G latest version). The chain-of-custody form will be completed, and a unique chain-of-custody number will be assigned.

5.4 DATA MANAGEMENT AND REPORTING

This section outlines the data management procedures to be followed for the inventory, control, storage, and retrieval of data (both field and other) collected during the performance of the OPWL field investigation. The procedures contained in this section are designed to maintain the integrity of collected data for subsequent use. Moreover, project tracking data (e.g., schedules, progress reports, and financial reports) will be maintained to monitor, manage, and document the progress of the investigation. Analytical laboratories for the project are under separate contract to EG&G; therefore, the analytical data for the project will be managed in accordance with that contract.

5.4.1 Field Data

Field data will be input into RFEDS using a DATACAP remote data entry module supplied by EG&G. The data sample coordinator will enter data daily. A 3.5-inch computer diskette containing the pertinent data information will be delivered to EG&G weekly. A hard copy report will be generated from the module for the subcontractor's use. The data will undergo a prescribed QC process based on EMD OP FO.14, *Field Data Management* (EG&G latest version).

A sample tracking spreadsheet will be maintained by the subcontractor for use in tracking sample collection and shipments. These data will also be delivered to EG&G on 3.5-inch computer diskettes. Any updates or changes to the RFEDS system will be incorporated, when appropriate.

5.4.2 Receipt of Data and Reports

A document control clerk will be responsible for recording the type of document received, the date received, the document date, and its originating organization. A control number will be assigned and entered into the database. The document control numbers will be organized in the following format: (VVVVVVVV) (XXXXX)-(YYYYY)

where:

(VVVVVVVV)	is the project number;
(XXXXX)	refers to the originating organization; and
(YYYYY)	is the sequential serial number assigned to each particular document.

The following codes will be assigned for each originating organization:

JE	Jacobs Engineering
EG	EG&G
DOE	Department of Energy
EPA	Environmental Protection Agency
CDPHE	Colorado Department of Public Health and Environment

If distribution is required, the appropriate number of copies will be made and distributed. The original document that is received will be kept in the document control files.

5.4.3 Outgoing Data and Reports

The document control clerk will maintain a log of all project data and reports sent out. All outgoing project data and reports will be assigned a document control number. The document control numbers will be organized according to the following format: (VVVVVVVV)-(YYYYY), where (VVVVVVVV) is the project number, and (YYYYY) is the sequential serial number assigned to a particular document. All outgoing reports and maps will receive a rigorous technical and peer review.

5.4.4 Telephone Logs and Meeting Notes

All notes from project meetings and telephone conversations will be maintained by personnel assigned to the project. These notes will be retained by project personnel until the conclusion of the projects, at which time they will be filed with the original project documents.

TABLE 5-1
Operating Procedures
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

Procedure	Name
EMD OP FO.02	Transmittal of Field QA Records - describes disposition of field QA records.
EMD OP FO.03	General Equipment Decontamination - describes procedures for cleaning equipment.
EMD OP FO.04	Heavy Equipment Decontamination - describes procedures for decontamination of heavy equipment such as drilling equipment.
EMD OP FO.06	Handling of Personal Protective Equipment - describes disposition of personal protective equipment.
EMD OP FO.07	Handling of Decontamination Water and Wash Water - describes procedures for the disposition of decontamination water.
EMD OP FO.08	Handling of Drilling Fluids and Cuttings - describes proper disposition of drilling fluids and cuttings.
EMD OP FO.09	Handling of Residual Samples - describes proper handling of residual samples.
EMD OP FO.11	Field Communications - describes proper field communication procedures.
EMD OP FO.13	Containerization, Preserving, Handling and Shipping of Soil and Water Samples - describes procedures for handling and shipping of environmental samples.
EMD OP FO.14	Field Data Management - describes procedures for entry and management of field data.
EMD OP FO.15	Photoionization Detectors (PIDs) and Flame Ionization Detectors (FIDs) - describes procedures for monitoring organic vapors.
EMD OP FO.16	Field Radiological Measurements - describes procedures for collecting, measuring, and testing of radionuclides.
EMD OP FO.23	Management of Soil and Sediment Investigation Derived Material (IDM) - describes proper handling and disposition of IDM.
EMD OP FO.28	Tank and Pipeline Investigation for RFI/RI - describes operating procedures to be used for RFIs and RIs of abandoned tanks and pipelines.
EMD OP GT.01	Logging of Alluvial and Bedrock Material - describes procedures for logging subsurface-soil samples.
EMD OP GT.02	Drilling and Sampling Using Hollow-stem Auger Techniques - describes borehole drilling and sampling.
EMD OP GT.05	Plugging and Abandonment of Boreholes - describes and discusses procedures for borehole abandonment.
EMD OP GT.07	Logging and Sampling of Test Pits and Trenches and Construction Excavations - describes procedures for logging and sampling at test pits.

TABLE 5-1
Operating Procedures
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

Procedure	Name
EMD OP GT.08	Surface Soil Sampling - describes procedures for collecting surface-soil samples.
EMD OP GT.10	Borehole Clearing - describes procedures for utility clearance and permitting.
EMD OP GT.18	Surface Geophysical Surveys - describes procedures for use of magnetic locator.
EMD OP GT.27	In Situ Characterization for Radionuclides - describes measurement of radionuclides.
EMD OP GT.30	Autonomous Operation of Global Positioning Equipment - describes procedures for use of global positioning of equipment.
EMD OP GW.06	Groundwater Sampling - describes procedures for use of the HydroPunch®.
EMD OP SW.2	Field Measurements of Surface Water Field Parameters - describes in situ measurement of field parameters.
EMD OP SW.3	Surface Water Sampling - describes procedures for collecting surface-water samples.
RFP PROCEDURE 1-B37-HSP-12.08	Excavations and Trenching - describes procedures for excavating and trenching.
RFP PROCEDURE 21000-SUI-SW-01	Video Inspection of Pipelines - describes procedures for inspecting pipelines using remote video equipment.

Notes:

EMD = Environmental Management Department

FID = Flame Ionization Detector

IDM = Investigative Derived Material

OP = Operating Procedure

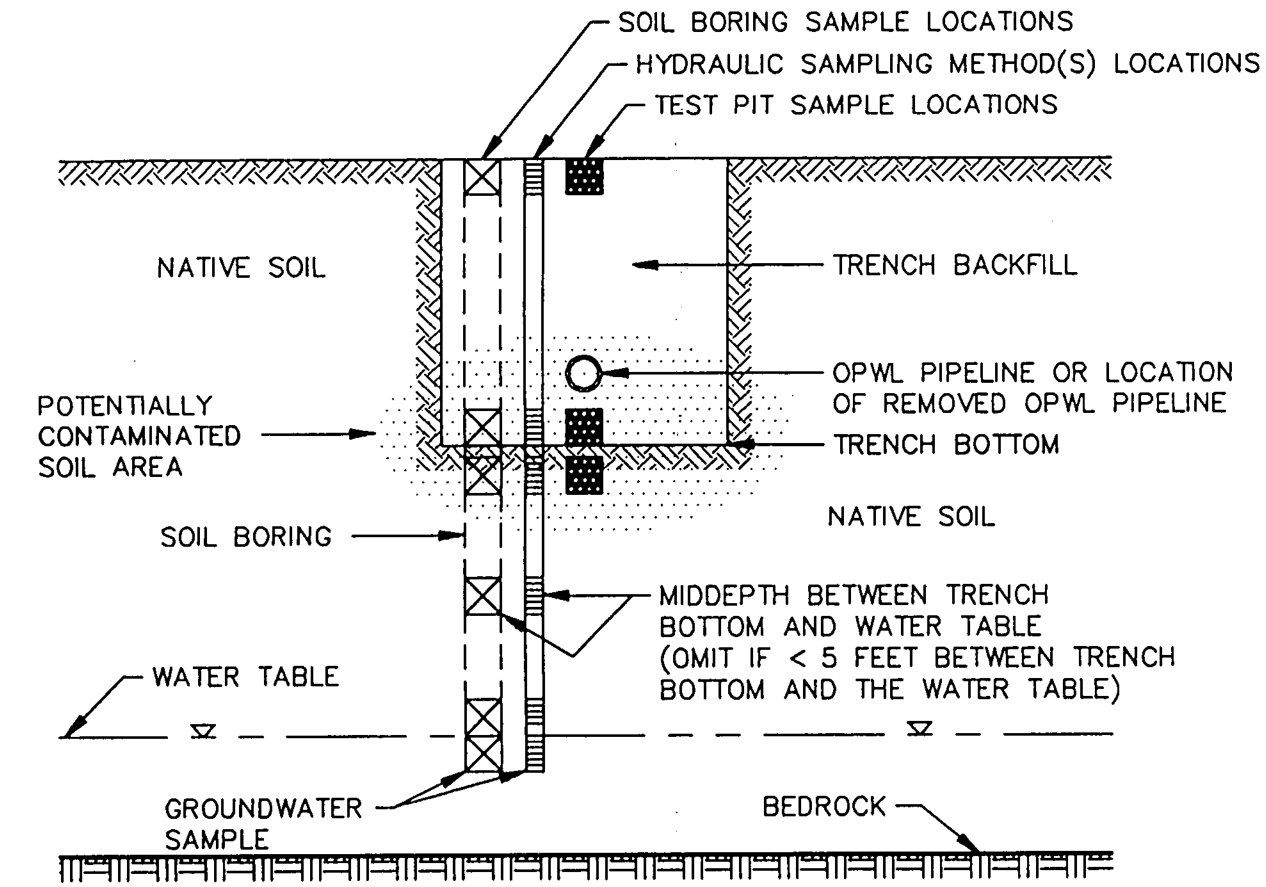
OU = Operable Unit

PID = Photoionzation Detector

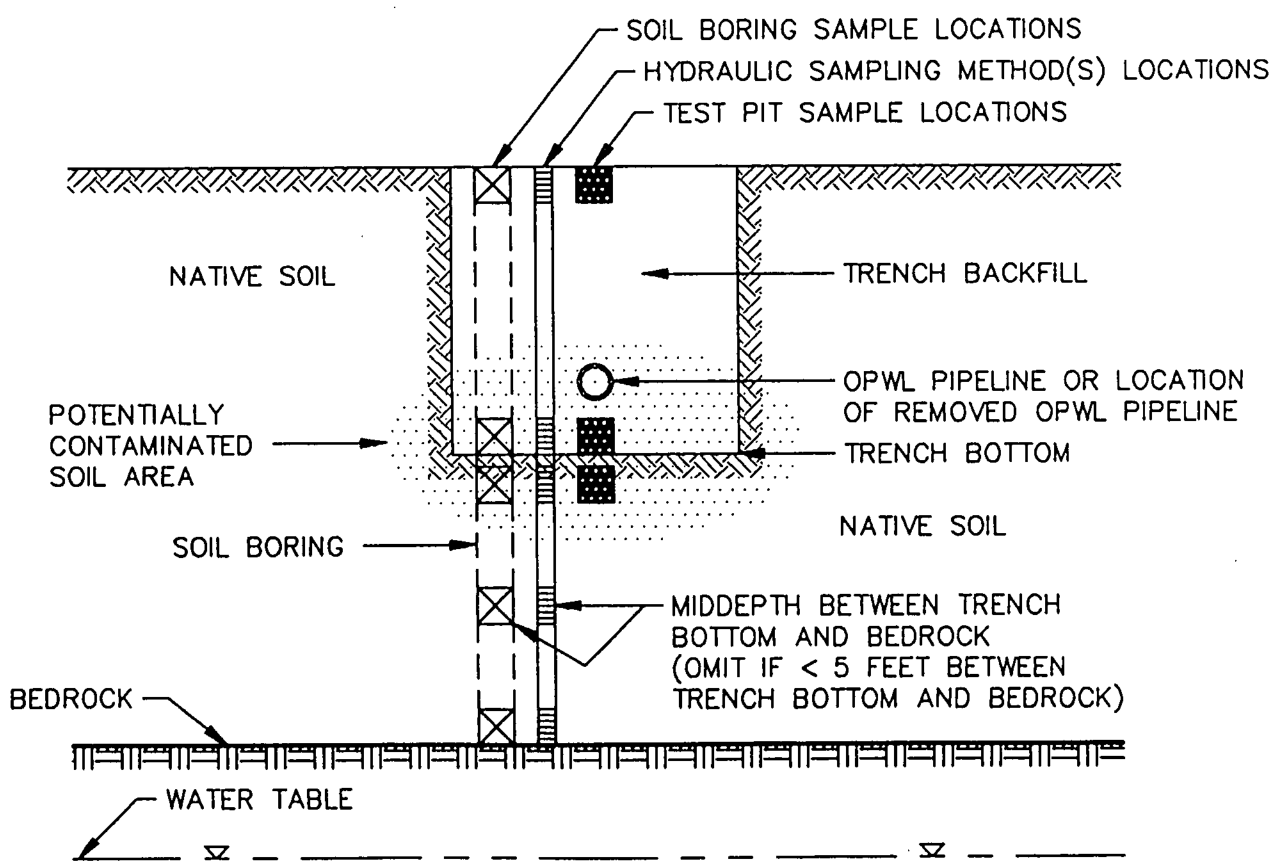
QA = Quality Assurance

RCRA = Resource Conservation and Recovery Act

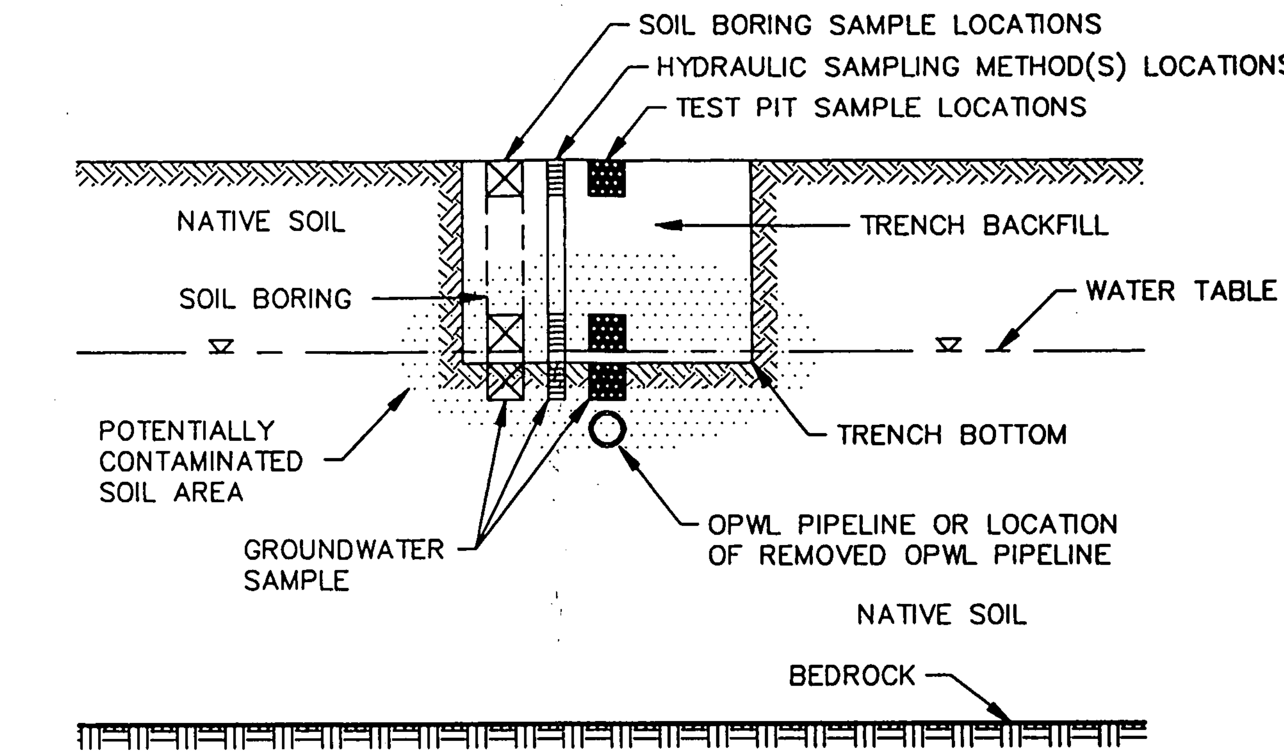
RFI/RI = RCRA Facility Investigation/Remedial Investigation



EXAMPLE 1 - WATER TABLE ABOVE BEDROCK



EXAMPLE 2 - WATER TABLE WITHIN BEDROCK



NOTE: UNDER THIS SCENARIO, A GROUNDWATER GRAB SAMPLE WILL BE COLECTED AND THE NATIVE SOIL SAMPLE BENEATH THE OPWL PIPELINE WILL BE OMITTED.

EXAMPLE 3 - WATER TABLE ABOVE OPWL PIPELINE

NOTE: NOT TO SCALE

FIGURE 5-1

PIPELINE TEST AREA
SAMPLE LOCATIONS

OPERABLE UNIT 9
ORIGINAL PROCESS WASTE LINES
TECHNICAL MEMORANDUM 1, VOLUME II

EG&G ROCKY FLATS

Rocky Flats Environmental
Technology Site
P.O. Box 464
Golden, Colorado 80402-0464

C:\RFLATS\OU9\FIG5-1.DWG 05H60209

6.0 SAMPLE ANALYSIS

The purpose of this section is to summarize the analytical program for operations conducted under the RFI/RI field investigation proposed for OU9. Specifically, analytical methodologies, analytes, detection/quantitation limits, sample container and preservation requirements, and field QC sample requirements are presented. A discussion of the field sampling approach and objectives for the RFI/RI program are presented in Section 4.0 of this memorandum. Field methodologies, including sampling procedures, are discussed in Section 5.0.

6.1 ANALYTICAL REQUIREMENTS

The specific set of analytical parameters developed for Stage 1 samples was derived from contaminant information from other RFET Integrated OUs, known operational history of the individual OPWL pipelines, and known contaminant releases. Table 6-1 presents the specific analytical methodologies that will be used to analyze samples from the investigation of each of the OPWL pipelines. A brief rationale justifying the proposed analytical suite is also included. Specific analytes and their associated detection limits and/or quantitation limits are presented in Table 6-2.

In general, sample analyses for the pipeline investigation include Target Compound List (TCL) volatiles, TCL semivolatiles, TCL organochlorine pesticides/PCBs, chlorinated herbicides, Target Analyte List metals, cyanide and hexavalent chromium, various radionuclide analyses, and water-quality parameters (including nitrate/nitrite, sulfate, chloride, fluoride, pH, specific conductance, and total organic carbon). Wipe samples will be analyzed for gross alpha and gross beta. In addition, initial results from the RFI/RI sampling activities may dictate changes to future analytical suites for some or all media and/or sample locations.

Contaminant analysis will be performed in accordance with the protocols specified in the latest version of the EPA Contract Laboratory Program (CLP) *Statements of Work for Inorganic and Organic Analyses* (EPA 1988) and the EPA *Methods for Chemical Analysis of Water and Wastes* (EPA 1983). Radionuclide analysis will be performed according to the methodologies referenced in Table 6-2.

6.2 SAMPLE CONTAINERS AND PRESERVATIONS

Sample volume requirements, preservation techniques, holding times, and container material requirements are dictated by the media being sampled and by the analyses to be performed. Analytical parameters of interest for residue, soil, and groundwater matrices along with the associated container size, preservatives (chemical and/or temperature), and holding times are listed in Table 6-3. Additional information about sample containers and preservatives is provided in EMD OP FO.13, *Containerization, Preserving, Handling, and Shipping of Soil and Water Samples* (EG&G latest version).

6.3 FIELD QUALITY CONTROL PROCEDURES

Field QC procedures for environmental sampling are discussed in this section. The analytical results obtained for the QC samples will be used to provide measures of the internal consistency of sampling procedures and storage practices. The types and functions of field QC samples are discussed in the following sections. The frequencies with which QC samples will be collected are provided in Table 6-4. For further information about field sampling QA and QC, refer to the *Rocky Flats Plant Site-Wide Quality Assurance Project Plan for CERCLA Remedial Investigations/Feasibility Studies* (EG&G 1994e).

Duplicate samples will be collected and analyzed to provide an indication of overall sampling and analytical precision. These samples will be collected following the same procedures and using the same equipment as was used to obtain the original sample. Duplicates will be stored and preserved in the same manner and will be submitted for the same analyses as the original sample. One field duplicate sample will be collected for every 20 samples taken.

Field blanks shall consist of volatile-free American Society for Testing and Materials (ASTM) Type II reagent water and shall be handled in the field in the same manner as regular samples. The field blanks serve to identify contamination potentially associated with sample collection, preparation, and transportation. Field blanks will be prepared for use with water samples only. The use of field blanks for soil sampling at RFETS is not appropriate because of the lack of commercially available blank soils and solid materials that adequately reflect the various types of soils to be encountered. Field blank samples will be transported with the regular samples to the laboratory for analysis. Field blanks will be analyzed in the laboratory as if they were regular samples. One field blank will be prepared for every 20 samples.

Equipment rinsate blanks will be obtained when sample collection requires the use of sampling equipment. Analyses of equipment rinsates are used to assess the effectiveness of equipment decontamination. Equipment blanks are collected by rinsing volatile-free ASTM Type II water into, through, and over decontaminated sampling equipment and then collecting it into prepared sample bottles. Equipment blank samples will be transported with the regular samples to the laboratory for analysis. Equipment blanks will be analyzed in the laboratory as if they were regular samples. One equipment blank will be collected for every 20 samples or once a day, whichever is more frequent.

Trip blanks serve to assess the potential for cross contamination of VOCs within sample containers used during storage, sample collection, and transport activities. Trip blanks consist of volatile-free ASTM Type II reagent water that will be prepared by the laboratory. The trip blanks will be shipped to the sampling site with the regular sample bottles and then transported back for analysis with the samples collected during the sampling event. The trip blanks will remain unopened throughout the sampling event and will be prepared and analyzed at the laboratory as if they were regular samples. Trip blanks are associated with organic analysis samples only. One trip blank will be submitted for analysis for every 20 samples submitted for organic analysis.

TABLE 6-1
Analytical Parameters
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

ANALYSIS																					
Pipeline Number	TAL for Metals	Chromium +6	Tantalum	TCL Volatiles	TCL Semi-volatiles	TCL Pesticides	TCL PCBs	Chlorinated Herbicides	Total Organic Carbon	WQPL	Gross Alpha	Gross Beta	Uranium 233 and 234	Uranium 235	Uranium 238	Americium 241	Plutonium 239 and 240	Tritium	Curium	N_p-237	Rationale
Method (1)		E218.4	EPA CLP SOW	EPA CLP SOW	EPA CLP SOW	EPA CLP SOW	EPA CLP SOW	E615	E415.1	n	a,b,c, d,h,m	i,e,f,g	a,c,d,g,f ,h,m	a,c,d,g,f ,h,m	a,c,d,g,f ,h,m	d,f,j,k,m	d,f,i,g,m	a,b,c,d ,f,g,m			
P-1	X	N/A	N/A	X	X		X		X	X	X	X	X	X	X	X	X		X	N/A	Line carried process waste including acids, bases, solvents, radionuclides, metals, and other compounds from Bldg. 123. Line listed on closure plan as an area of reported release.
P-2	X	N/A	N/A	X	X		X		X	X	X	X	X	X	X	X	X	N/A	X	N/A	Same as above.
P-3	X	N/A	N/A	X	X		X		X	X	X	X	X	X	X	X	X	N/A	X	N/A	Same as above.
P-4	X	X	X	X	X		X		X	X	X	X	X	X	X	X	X	N/A	X	N/A	Line carried process waste from Bldgs. 123, 441, and 444. Waste contained assorted acids, bases, solvents, metals, and radionuclid
P-5	X	X	X	X	X		X		X	X	X	X	N/A	N/A	X	N/A	N/A	N/A	N/A	N/A	Line carried process waste from Bldg. 444. Waste contained assorted acids, bases, solvents, metals, U-238 radionuclides only, and other compounds. Reports indicate numerous leaks from P-5.
P-6	X	X	X	X	X		X		X	X	X	X	X	X	X	X	X		X	X	Same (Bldgs. 123, 441, 444, 865, 881, and 889).
P-7	X	X		X	X		X		X	X	X	X	X	X	X	X	X			X	Line carried process waste from Bldg. 881 including assorted acids, bases, solvents, metals, radionuclides, and other compounds. Pipeline has been identified as an area of release.

TABLE 6-1 (continued)
Analytical Parameters
OU9 Original Process Waste Lines
Rocky Flats Plant, Colorado

ANALYSIS																					
Pipeline Number	TAL for Metals	Chromium +6	Tantalum	TCL Volatiles	TCL Semi-volatiles	TCL Pesticides	TCL PCBs	Chlorinated Herbicides	Total Organic Carbon	WQPL	Gross Alpha	Gross Beta	Uranium 233 and 234	Uranium 235	Uranium 238	Americium 241	Plutonium 239 and 240	Tritium	Curium	N_p-237	Rationale
Method (1)		E218.4	EPA CLP SOW	EPA CLP SOW	EPA CLP SOW	EPA CLP SOW	EPA CLP SOW	E615	E415.1	n	a,b,c,d,h,m	i,e,f,g	a,c,d,g,f,h,m	a,c,d,g,f,h,m	a,c,d,g,f,h,m	d,f,j,k,m	d,f,i,g,m	a,b,c,d,f,g,m			
P-8	Pipeline Does Not Exist																				
P-9	X			X	X				X	X	X	X		X	X						Line carried process waste from Bldg. 883. Waste included bases, solvents, metals, and isotopes of U. Leaks are known to have occurred along P-9.
P-10	X	X	X	X	X				X	X	X	X			X						Line carried process waste from Bldgs. 865 and 889. Waste included various acids, bases, solvents, metals, oils, and U-238. Leaks are known to have occurred.
P-11	X	X	X	X	X		X		X	X	X	X	X	X	X	X	X		X	X	Line carried process waste from Bldgs. 123, 441, 444, 865, 881, 883, and 889. Waste included various acids, bases, solvents, metals, radionuclides, and oils. Leaks are known to have occurred.
P-12 through P-14	X	X	X	X	X		X		X	X	X	X	X	X	X	X	X		X	X	Waste streams from lines 1 through 11 have released into lines 12 through 14.
P-15	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	Waste streams from lines 14 and 16 have released into line.
P-16	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				Line carried process waste from Bldg. 559. Waste included various acids, bases, solvents, metals, radionuclides, oils, pesticides, and herbicides.

TABLE 6-1 (continued)
Analytical Parameters
OU9 Original Process Waste Lines
Rocky Flats Plant, Colorado

ANALYSIS																					
Pipeline Number	TAL for Metals	Chromium +6	Tantalum	TCL Volatiles	TCL Semi-volatiles	TCL Pesticides	TCL PCBs	Chlorinated Herbicides	Total Organic Carbon	WQPL	Gross Alpha	Gross Beta	Uranium 233 and 234	Uranium 235	Uranium 238	Americium 241	Plutonium 239 and 240	Tritium	Curium	N_p-237	Rationale
Method (1)		E218.4	EPA CLP SOW	EPA CLP SOW	EPA CLP SOW	EPA CLP SOW	EPA CLP SOW	E615	E415.1	n	a,b,c, d,h,m	i,e,f,g	a,c,d,g,f ,h,m	a,c,d,g,f ,h,m	a,c,d,g,f ,h,m	d,f,j,k,m	d,f,i,g,m	a,b,c,d ,f,g,m			
P-17	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				Line carried process waste from Bldg. 559. Waste included various acids, bases, solvents, metals, radionuclides, oils, pesticides, and herbicides.
P-18	Pipeline Does Not Exist																				
P-19	X		X	X	X				X	X	X	X	X	X	X	X	X				Line carried process waste from Bldg.707. Waste included solvents, radionuclides, metals, oils, fluorides, and chlorides.
P-20	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	Waste streams from lines 1 through 19 have released into line.
P-21	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	Waste streams from lines 1 through 20 have released into line.
P-22	X	X	X	X	X		X		X	X	X	X	X	X	X	X	X	X	X		Line carried process waste from Bldg. 771. Waste included acids, bases, solvents, radionuclides, metals, fuel oils, and PCBs.
P-24	X	X	X	X	X		X		X	X	X	X	X	X	X	X	X	X	X		Line carried process waste from Bldg. 771. Waste included acids, bases, solvents, radionuclides, metals, fuel oils, and PCBs.
P-25	X	X	X	X	X		X		X	X	X	X	X	X	X	X	X	X	X		Line carried process waste from Bldg. 771. Waste included acids, bases, solvents, radionuclides, metals, fuel oils, and PCBs.

TABLE 6-1 (continued)
Analytical Parameters
OU9 Original Process Waste Lines
Rocky Flats Plant, Colorado

ANALYSIS																					
Pipeline Number	TAL for Metals	Chromium +6	Tantalum	TCL Volatiles	TCL Semi-volatiles	TCL Pesticides	TCL PCBs	Chlorinated Herbicides	Total Organic Carbon	WQPL	Gross Alpha	Gross Beta	Uranium 233 and 234	Uranium 235	Uranium 238	Americium 241	Plutonium 239 and 240	Tritium	Curium	N_p-237	Rationale
Method (1)		E218.4	EPA CLP SOW	EPA CLP SOW	EPA CLP SOW	EPA CLP SOW	EPA CLP SOW	E615	E415.1	n	a,b,c, d,h,m	i,e,f,g	a,c,d,g,f ,h,m	a,c,d,g,f ,h,m	a,c,d,g,f ,h,m	d,f,j,k,m	d,f,i,g,m	a,b,c,d ,f,g,m			
P-26	X	X	X	X	X				X	X	X	X	X	X	X	X	X				Line carried process waste from Bldg. 774. Waste included various acids and bases, solvents, radionuclides, metals, and chlorides.
P-27	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Waste streams from lines 1 through 20 and line 25 have released into line.
P-28	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Waste streams from lines 1 through 20 and line 25 have released into line.
P-29	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Waste streams from lines 1 through 20 and line 25 have released into line.
P-30	X	X		X	X				X	X	X	X				X	X	X			Line carried process waste from Bldgs. 776 & 777. Waste included solvents, radionuclides, metals, and oils.
P-32									X	X	X	X	X	X	X	X	X				Line carried process waste from Bldg. 778. Waste included radionuclides.
P-33	X	X	X	X	X		X		X	X	X	X	X	X	X	X	X	X	X		Line carried process waste from Bldg. 771. Waste included various acids and bases, solvents, radionuclides, metals, fuel oils, and PCBs.

TABLE 6-1 (continued)
Analytical Parameters
OU9 Original Process Waste Lines
Rocky Flats Plant, Colorado

ANALYSIS																					
Pipeline Number	TAL for Metals	Chromium +6	Tantalum	TCL Volatiles	TCL Semi-volatiles	TCL Pesticides	TCL PCBs	Chlorinated Herbicides	Total Organic Carbon	WQPL	Gross Alpha	Gross Beta	Uranium 233 and 234	Uranium 235	Uranium 238	Americium 241	Plutonium 239 and 240	Tritium	Curium	N_p-237	Rationale
Method (1)		E218.4	EPA CLP SOW	EPA CLP SOW	EPA CLP SOW	EPA CLP SOW	EPA CLP SOW	E615	E415.1	n	a,b,c, d,h,m	i,e,f,g	a,c,d,g,f ,h,m	a,c,d,g,f ,h,m	a,c,d,g,f ,h,m	d,f,j,k,m	d,f,i,g,m	a,b,c,d ,f,g,m			
P-34	X	X	X	X	X		X		X	X	X	X	X	X	X	X	X	X	X		Line carried process waste from Bldg. 771. Waste included acids, bases, solvents, radionuclides, metals, fuel oils, and PCBs.
P-35	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	All COC may have passed through line 34. Waste streams from all areas have released into line.
P-36	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	Waste streams from lines 1 through 20 have released into line.
P-37	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	All COC may have passed through lines. Waste streams from all areas have release into line.
P-38	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	All COC may have passed through lines. Waste streams from all areas have release into line.
P-39	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	All COC may have passed through lines. Waste streams from all areas have release into line.
P-40	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	All COC may have passed through lines. Waste streams from all areas have release into line.

TABLE 6-1 (continued)
Analytical Parameters
OU9 Original Process Waste Lines
Rocky Flats Plant, Colorado

ANALYSIS																					
Pipeline Number	TAL for Metals	Chromium +6	Tantalum	TCL Volatiles	TCL Semi-volatiles	TCL Pesticides	TCL PCBs	Chlorinated Herbicides	Total Organic Carbon	WQPL	Gross Alpha	Gross Beta	Uranium 233 and 234	Uranium 235	Uranium 238	Americium 241	Plutonium 239 and 240	Tritium	Curium	N_p-237	Rationale
Method (1)		E218.4	EPA CLP SOW	EPA CLP SOW	EPA CLP SOW	EPA CLP SOW	EPA CLP SOW	E615	E415.1	n	a,b,c,d,h,m	i,e,f,g	a,c,d,g,f,h,m	a,c,d,g,f,h,m	a,c,d,g,f,h,m	d,f,j,k,m	d,f,i,g,m	a,b,c,d,f,g,m			
P-41	X	X	X	X	X				X	X	X	X	X	X	X	X	X	X			Line carried process waste from Bldgs. 776, 777, 778 & 779. Waste included various acids and bases, solvents, radionuclides, metals, and oils.
P-42	X	X	X	X	X				X	X	X	X			X	X	X				Line carried process waste from Bldg. 779. Waste included various acids, bases, solvents, radionuclides, metals, and oils.
P-43	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Line carried process waste from Bldgs. 776, 777, 778 & 779. Waste included various acids and bases, solvents, radionuclides, metals, and oils.
P-44	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	All COC may have passed through lines. Waste streams from all areas have release into line.
P-45	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Process waste line with unknown COC. Bldg. 703
P-46	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Waste streams from all areas may have released into line. All COC may be present.
P-53	X	X		X	X		X		X	X	X	X	X	X	X	X	X			X	Line carried waste from Bldg. 881. Waste included various acids, bases, solvents, metals, radionuclides, and other compounds of oil and PCB.

TABLE 6-1 (continued)
Analytical Parameters
OU9 Original Process Waste Lines
Rocky Flats Plant, Colorado

ANALYSIS																					
Pipeline Number	TAL for Metals	Chromium +6	Tantalum	TCL Volatiles	TCL Semi-volatiles	TCL Pesticides	TCL PCBs	Chlorinated Herbicides	Total Organic Carbon	WQPL	Gross Alpha	Gross Beta	Uranium 233 and 234	Uranium 235	Uranium 238	Americium 241	Plutonium 239 and 240	Tritium	Curium	N_p-237	Rationale
Method (1)		E218.4	EPA CLP SOW	EPA CLP SOW	EPA CLP SOW	EPA CLP SOW	EPA CLP SOW	E615	E415.1	n	a,b,c, d,h,m	i,e,f,g	a,c,d,g,f ,h,m	a,c,d,g,f ,h,m	a,c,d,g,f ,h,m	d,f,j,k,m	d,f,i,g,m	a,b,c,d ,f,g,m			
P-54	X	X		X	X		X		X	X	X	X	X	X	X	X	X			X	Line carried waste from Bldg. 881. Waste included various acids, bases, solvents, metals, radionuclides, and other compounds of oil and PCB.
P-55	X	X		X	X		X		X	X	X	X	X	X	X	X	X			X	Line carried waste from Bldg. 881. Waste included various acids, bases, solvents, metals, radionuclides, and other compounds of oil and PCB.
P-58	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	Waste streams from lines 1 through 20 have released into line.
P-59	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Waste streams from all areas have released into line. All COC may be present.
P-60	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Waste streams from all areas have released into line. All COC may be present.
P-61	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Waste streams from all areas have released into line. All COC may be present.
P-62	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				Line carried process waste from Bldg. 559. Waste included various acids and bases, solvents, metals, PCBs, radionuclides, and oils.
P-63									X	X	X	X		X			X				Line carried process waste from Bldg. 886. Wastes included radionuclides.

TABLE 6-1 (continued)
Analytical Parameters
OU9 Original Process Waste Lines
Rocky Flats Plant, Colorado

ANALYSIS																					
Pipeline Number	TAL for Metals	Chromium +6	Tantalum	TCL Volatiles	TCL Semi-volatiles	TCL Pesticides	TCL PCBs	Chlorinated Herbicides	Total Organic Carbon	WQPL	Gross Alpha	Gross Beta	Uranium 233 and 234	Uranium 235	Uranium 238	Americium 241	Plutonium 239 and 240	Tritium	Curium	N_p-237	Rationale
Method (1)		E218.4	EPA CLP SOW	EPA CLP SOW	EPA CLP SOW	EPA CLP SOW	EPA CLP SOW	E615	E415.1	n	a,b,c,d,h,m	i,e,f,g	a,c,d,g,f,h,m	a,c,d,g,f,h,m	a,c,d,g,f,h,m	d,f,j,k,m	d,f,i,g,m	a,b,c,d,f,g,m			
P-64									X	X	X	X		X			X				Line carried process waste from Bldg. 886. Wastes included radionuclides.
P-65									X	X	X	X		X			X				Line carried process waste from Bldg. 886. Wastes included radionuclides.
P-66									X	X	X	X		X			X				Line carried process waste from Bldg. 886. Wastes included radionuclides.

COC - Chemicals of Concern
PCBs - Polychlorinated Biphenyls
TAL - Target Analyte List
TCL - Target Compound List
U - Uranium
WQPL - Water Quality Parameter List

(1)
a. U.S. Environmental Protection Agency. 1979a *Radiochemical Analytical Procedures for Analysis of Environmental Samples.* Report No. EMSL-LY-0539-1, Las Vegas, NV, U.S.Environmental Protection Agency.
b. American Public Health Association, American Water Works Association, Water Pollution Control Federation. 1985. *Standard Methods for the Examination of Water and Wastewater.* 16th ed., Washington, D.C., Am. Public Health Association.
c. U.S. Environmental Protection Agency. 1976. *Interim Radiochemical Methodology for Drinking Water.* Report No. EPA-600/4-75-008. Cincinnati U.S. Environmental Protection Agency.
d. Harley, J.H., ed. 1975. *ASL Procedures Manual.* HASL-300, Washington, D.C., U.S. Energy Research and Development Association.
e. USAEC, Grand Junction Laboratory 1970. "Handbook of Analytical Procedures." Page 196.
f. U.S. Environmental Protection Agency. 1980 (August). "Prescribed Procedures for Measurement of Radioactivity in Drinking Water." EPA-600/4-80-032. Environmental Monitoring and Support Laboratory, Office of Research and Development, EPA, Cincinnati, Ohio, 45268.
g. U.S. Geological Survey. 1977. "Methods for Determination of Radioactive Substances in Water and Fluvial Sediments." U.S.G.S. Book 5, Chapter A5.
h. U.S. Environmental Protection Agency. 1979b (March). "Acid Dissolution Method for the Analysis of Plutonium in Soil." EPA-600/7-79-081. U.S. EPA Environmental Monitoring and Support Laboratory, Las Vegas, Nevada.
i. Essington, E.H. and B.J. Drennon. "Procedures for the isolation of Alpha Spectrometrically Pure Platoniumm Uranium, and Americium." Los Alamos National Laboratory, a private communication.
j. Rocky Flats Plant, Health, Safety, and Environmental Laboratories. "Isolation of Americium from Urine Samples."
k. U.S. Environmental Protection Agency. 1981. "Radioactivity in Drinking Water." EPA 570/9-81-002.
l. If the sample or duplicate result is <5 x IDL, then the control limit is $\pm$ IDL.
m. U.S. Environmental Protection Agency. 1987. "Eastern Environmental Radiation Facility Radiochemistry Procedures Manual." EPA 520/5-84-006.
n. E353.2 or E353.3, E375A.4, E325.2, E340.2, E150.1, and E120.1

EPA CLP SOW - *Statements of Work for Organic and Inorganic Analysis* (EPA 1988 or latest version).
E METHODS - *Methods for Chemical Analysis of Water and Wastes* (EPA 1983).

Note: Detection and quantitation limits are highly matrix dependent. The limits listed here are the minimum achievable under ideal conditions. Actual limits may be higher.

TABLE 6-2
Analytical Parameters and Detection/Quantitation Limits
For Sampling Activities at OU9
OU9 Original Process Waste Lines
Rocky Flats Environmental Technology Site, Colorado

Analytical Parameter	Method	Water Quantitation Limits	Soil Quantitation Limits
Target Analyte List Metals	EPA CLP SOW	(µg/L)	(mg/kg)
Aluminum		200	40
Antimony		60	12
Arsenic		10	2
Barium		200	40
Beryllium		5	1.0
Cadmium		5	1.0
Calcium		5000	2000
Cesium*		1000	200
Chromium		10	2.0
Cobalt		50	10
Copper		25	5.0
Cyanide		5	10
Iron		100	20
Lead		3	1.0
Lithium*		100	20
Magnesium		5000	2000
Manganese		15	3.0
Mercury		0.2	0.2
Molybdenum*		200	40
Nickel		40	8.0
Potassium		5000	2000
Selenium		5	1.0
Silver		10	2.0
Sodium		5000	2000
Strontium*		200	40
Thallium		10	2.0
Tin*		200	40
Vanadium		50	10.0
Zinc		20	4.0
Total Organic Carbon	E415.1	1 µg/L	1 mg/kg
Hexavalent Chromium	E218.4	10	1

7.0 SCHEDULE

The attached schedule has been modified from the original April 26, 1994 EG&G OU9 Detailed Schedule. It incorporates *OU9 Phase I RFI/RI Work Plan* (DOE 1992a) Stage 1 and 2 activities into a single, consolidated field investigation. The schedule has five major activity groups:

1. Field Sampling Plan Subcontracts/Locations Survey;
2. Tracing/Video/Pressure Testing;
3. Radiation Surveys;
4. Test Area and;
5. Confirmation Sampling.

Activity Group 1 factors time for finalization of the OWPL field sampling plan, modifying subcontracts, training, permitting, and surface location surveying before starting intrusive activities.

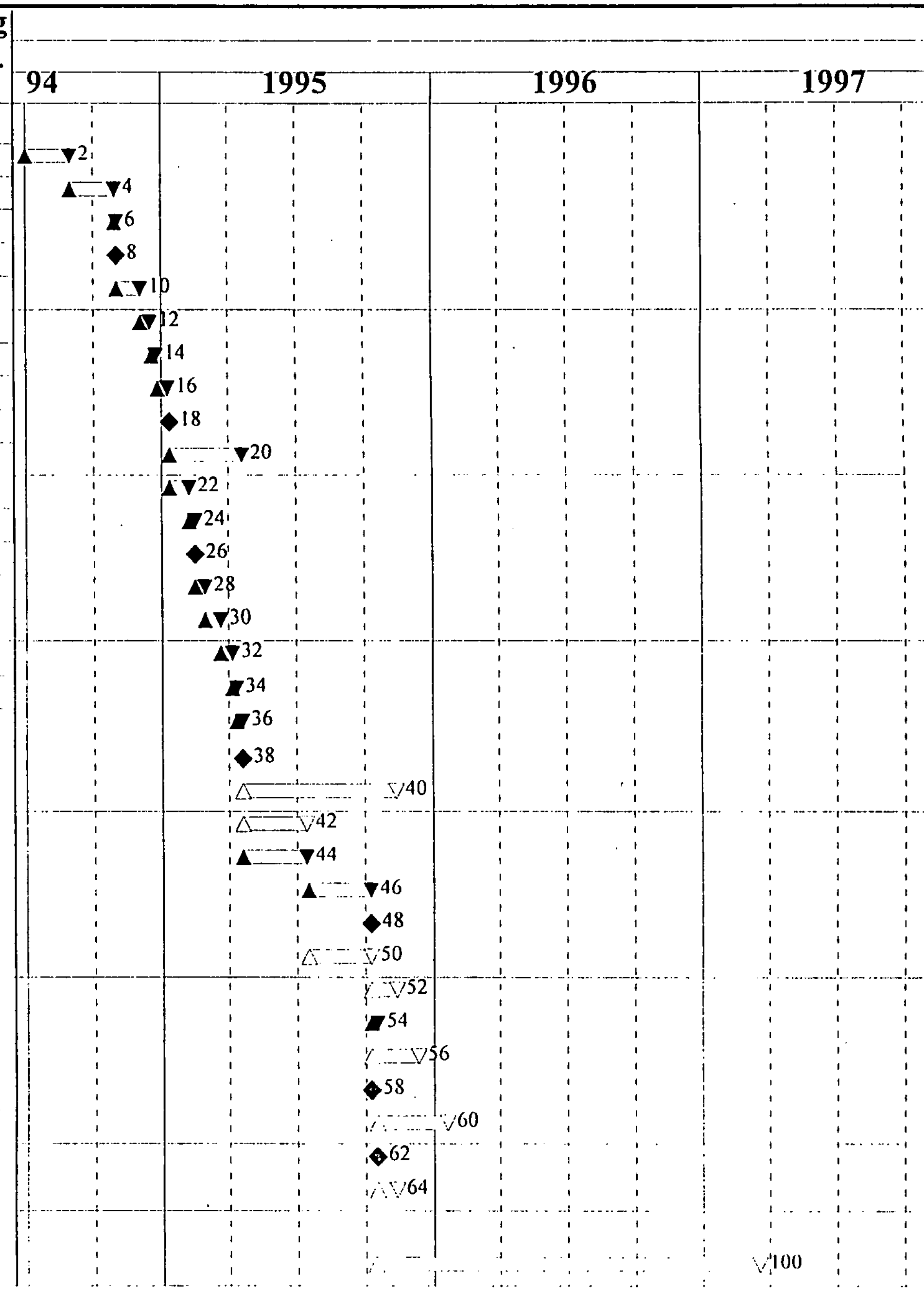
Activity Group 2 considers the duration of time necessary to perform pipeline tracing (using electronic or magnetic means), in situ video inspection, and pressure testing of the line(s). We assumed that, as an average, for each 100 feet of pipeline to be investigated, each activity (i.e., tracing, video, and pressure testing) would take one day. Therefore, for a 200-foot line, it would take six days to complete all of these activities. We also assumed that two crews were necessary to perform Group 2 activities to minimize overall activity duration. Therefore, activities for pipeline with even-numbered activity identifications (Act. ID) are performed by one crew, and those with odd numbered Act. IDs are performed by the second crew.

Activity Group 3 considers the time necessary to perform the 17-point radiation survey for each of the pipeline lengths. Again, we factored one day for each 100 feet of pipeline, as an average. This considered setup, calibration, survey, demobilization, and recording and quality control. Again, two survey crews were used to expedite this Group 3 activity.

Activity Group 4 estimates the time necessary to investigate and analyze samples from individual pipeline test area. Three days for each test area was the time used to estimate the average time necessary to complete the test pit, geoprobe, hand anger, etc.; collect samples; and backfill and/or restore the site to its original condition.

Activity Group 5 projects the time and duration of the confirmation sampling. We estimated that as many as six geoprobe locations will be completed each day and have assumed a 25 "hit" rate on contaminated soils inside the pipeline trench. Therefore, for every four geoprobe locations completed along a pipeline length, two geoprobes would be placed outside the pipeline trench to evaluate "lateral movement" of pipeline releases. For this Group 5 activity, two crews were required to minimize overall activity duration.

Act ID	Activity Description	Early Start	Early Finish	Orig Dur
FSP/SUBCONTRACTS/LOCATION SURVEY				
2	EG&G/DOE Review Draft of FSP	01JUL94*	29AUG94	41
4	Incorporate Comments	30AUG94	28OCT94	43
6	Transmit Draft Final FSP to DOE	31OCT94	31OCT94	1
8	Submit Draft Final FSP to CDPHE/EPA		01NOV94	0
10	CDPHE/EPA Review Draft Final FSP	01NOV94	01DEC94	21
12	Incorporate CDPHE/EPA Comments	02DEC94	16DEC94	11
14	Transmit Final to DOE	19DEC94	23DEC94	5
16	CDPHE/EPA Approval Process	27DEC94	09JAN95	9
18	Anticipated Apprvl of Fnl FSP TM#1 VOL II A&B		10JAN95	0
20	SUBCONTRACT MODIFICATON-OPWL	11JAN95	19APR95	70*
22	Modification to SOW	11JAN95	07FEB95	20
24	Procurement Review of Modification	08FEB95	14FEB95	5
26	Request For Proposal		14FEB95	0
28	Preparation of Proposal	15FEB95	28FEB95	10
30	Schedule Reserve	01MAR95	21MAR95	15
32	Technical Evaluation	22MAR95	04APR95	10
34	Negotiations	05APR95	10APR95	4
36	Preparation of Modification	11APR95	19APR95	6
38	Award of Subcontract Modification		19APR95	0
40	OPWL INVESTIGATIONS	20APR95	13NOV95	145*
42	OU 9 OPWL IWCP	20APR95	14JUL95	60
44	TRAINING FOR PIPELINE INVESTIGATIONS	20APR95	14JUL95	60
46	PERMITTING/MOBILIZATION	17JUL95	09OCT95	60
48	Authorization to Proceed	09OCT95		0
50	Soil Disturbance Permits	17JUL95	09OCT95	60
52	OUTSIDE INACTIVE OPWL INVESTIGATION	09OCT95	13NOV95	26*
54	PIPE LOCATION TRAINING	09OCT95	16OCT95	6
56	OU 9 PIPELINE Location Survey	10OCT95	11DEC95	43
58	Start Location Survey	09OCT95		0
60	Pipe Location	17OCT95	18JAN96	60
62	Start Location	17OCT95		0
64	Schedule Reserve	17OCT95	13NOV95	20
TRACING/VIDEO/PRESSURE TESTING				
100	TRACING/VIDEO/PRESSURE TESTING	16OCT95	17MAR97	351*



Project Start 01JUL94
Project Finish 10SEP97
Data Date 01JUL94
Plot Date 27OCT94

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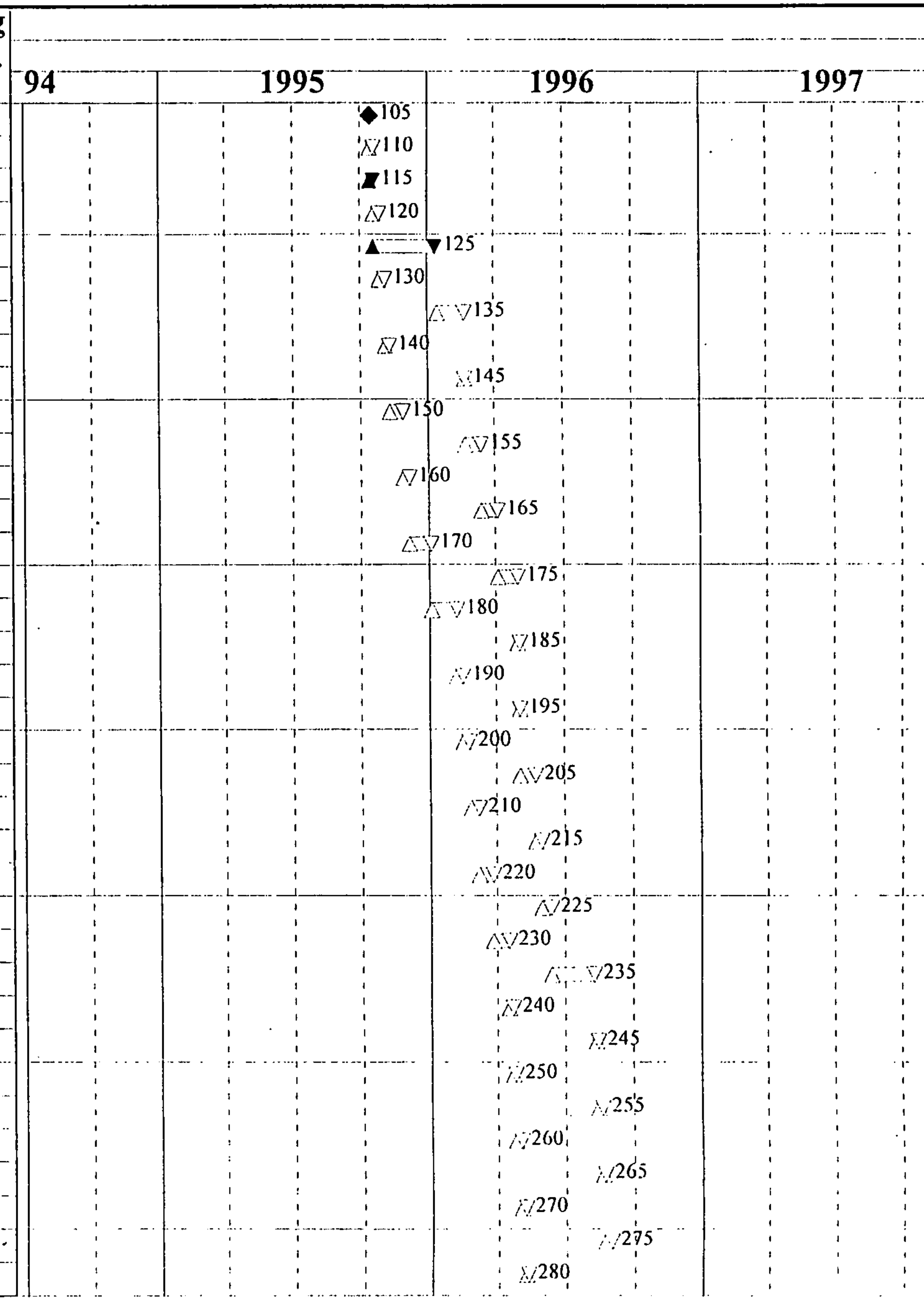
OU9 DETAIL SCHEDULE

OPWL FIELD INVESTIGATION

JE JACOBS ENGINEERING GROUP, INC.

Date	Revision	Checked	Approved

Act ID	Activity Description	Early Start	Early Finish	Orig Dur
105	Start Tracing/Video/Pressure Testing	16OCT95		0
110	Pipeline-P01-Tracing/Video/Pressure Testing	16OCT95	18OCT95	3
115	Pipeline-P02-Tracing/Video/Pressure Testing	16OCT95	18OCT95	3
120	Pipeline-P03-Tracing/Video/Pressure Testing	19OCT95	26OCT95	6
125	Pipeline-P04-Tracing/Video/Pressure Testing	19OCT95	12JAN96	54
130	Pipeline-P05-Tracing/Video/Pressure Testing	27OCT95	03NOV95	6
135	Pipeline-P06-Tracing/Video/Pressure Testing	15JAN96	20FEB96	27
140	Pipeline-P07-Tracing/Video/Pressure Testing	06NOV95	08NOV95	3
145	Pipeline-P08-Tracing/Video/Pressure Testing	21FEB96	20FEB96	0
150	Pipeline-P09-Tracing/Video/Pressure Testing	09NOV95	28NOV95	12
155	Pipeline-P10-Tracing/Video/Pressure Testing	21FEB96	12MAR96	15
160	Pipeline-P11-Tracing/Video/Pressure Testing	29NOV95	06DEC95	6
165	Pipeline-P12-Tracing/Video/Pressure Testing	13MAR96	03APR96	15
170	Pipeline-P13-Tracing/Video/Pressure Testing	07DEC95	04JAN96	15
175	Pipeline-P14-Tracing/Video/Pressure Testing	04APR96	29APR96	18
180	Pipeline-P15-Tracing/Video/Pressure Testing	05JAN96	07FEB96	24
185	Pipeline-P16-Tracing/Video/Pressure Testing	30APR96	02MAY96	3
190	Pipeline-P17-Tracing/Video/Pressure Testing	08FEB96	15FEB96	6
195	Pipeline-P18-Tracing/Video/Pressure Testing	03MAY96	02MAY96	0
200	Pipeline-P19-Tracing/Video/Pressure Testing	16FEB96	23FEB96	6
205	Pipeline-P20-Tracing/Video/Pressure Testing	03MAY96	23MAY96	15
210	Pipeline-P21-Tracing/Video/Pressure Testing	26FEB96	07MAR96	9
215	Pipeline-P22-Tracing/Video/Pressure Testing	24MAY96	29MAY96	3
220	Pipeline-P23-Tracing/Video/Pressure Testing	08MAR96	25MAR96	12
225	Pipeline-P24-Tracing/Video/Pressure Testing	30MAY96	11JUN96	9
230	Pipeline-P25-Tracing/Video/Pressure Testing	26MAR96	16APR96	15
235	Pipeline-P26-Tracing/Video/Pressure Testing	12JUN96	09AUG96	42
240	Pipeline-P27-Tracing/Video/Pressure Testing	17APR96	19APR96	3
245	Pipeline-P28-Tracing/Video/Pressure Testing	12AUG96	14AUG96	3
250	Pipeline-P29-Tracing/Video/Pressure Testing	22APR96	24APR96	3
255	Pipeline-P30-Tracing/Video/Pressure Testing	15AUG96	19AUG96	3
260	Pipeline-P31-Tracing/Video/Pressure Testing	25APR96	02MAY96	6
265	Pipeline-P32-Tracing/Video/Pressure Testing	20AUG96	22AUG96	3
270	Pipeline-P33-Tracing/Video/Pressure Testing	03MAY96	07MAY96	3
275	Pipeline-P34-Tracing/Video/Pressure Testing	23AUG96	30AUG96	6
280	Pipeline-P35-Tracing/Video/Pressure Testing	08MAY96	10MAY96	3



Project Start 01JUL94
Project Finish 10SEP97
Data Date 01JUL94
Plot Date 27OCT94

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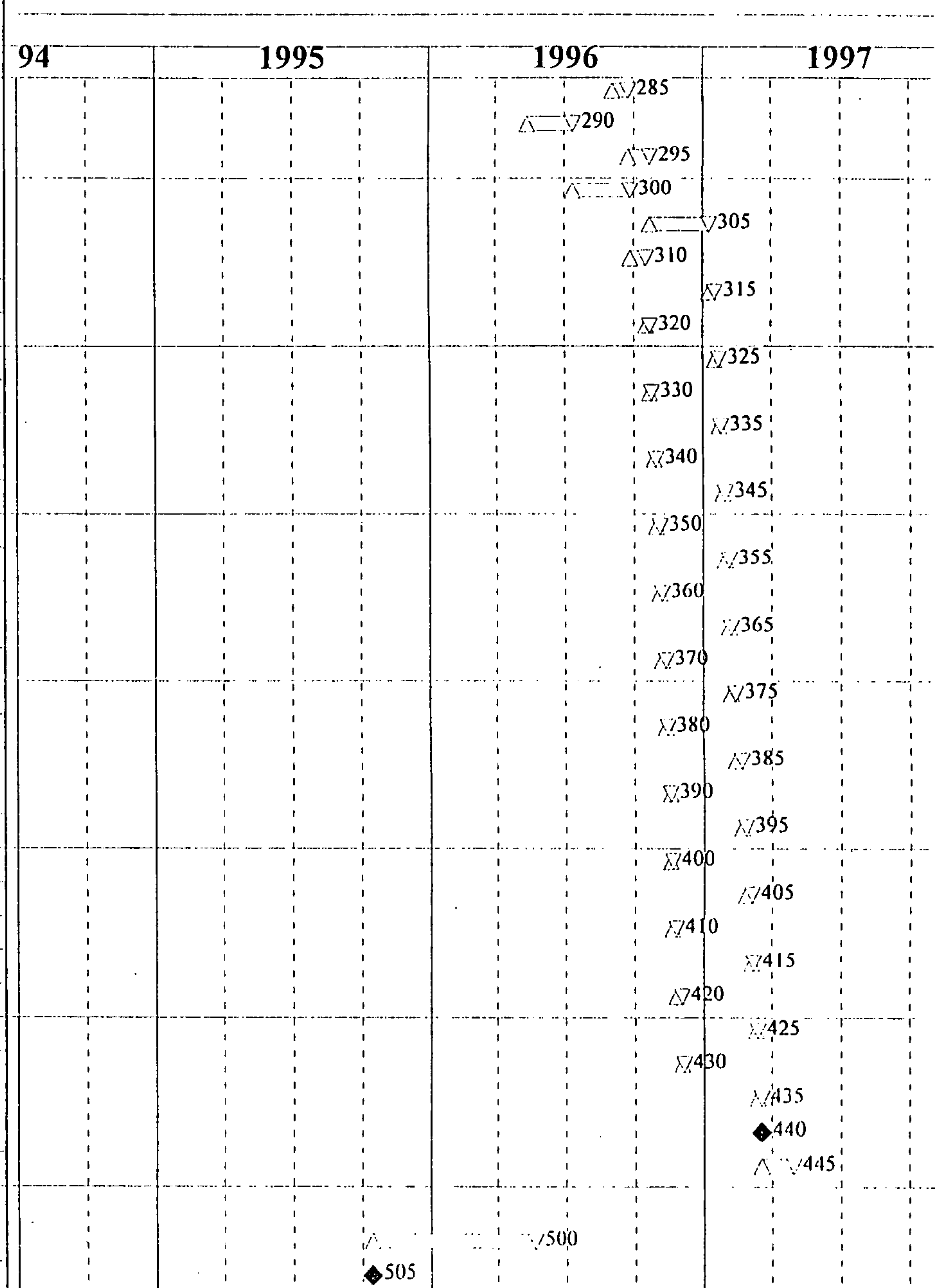
OU9 DETAIL SCHEDULE

OPWL FIELD INVESTIGATION

JE JACOBS ENGINEERING GROUP, INC.

Date	Revision	Checked	Approved

Act ID	Activity Description	Early Start	Early Finish	Orig Dur
285	Pipeline-P36-Tracing/Video/Pressure Testing	03SEP96	23SEP96	15
290	Pipeline-P37-Tracing/Video/Pressure Testing	13MAY96	11JUL96	42
295	Pipeline-P38-Tracing/Video/Pressure Testing	24SEP96	22OCT96	21
300	Pipeline-P39-Tracing/Video/Pressure Testing	12JUL96	26SEP96	54
305	Pipeline-P40-Tracing/Video/Pressure Testing	23OCT96	08JAN97	48
310	Pipeline-P41-Tracing/Video/Pressure Testing	27SEP96	17OCT96	15
315	Pipeline-P42-Tracing/Video/Pressure Testing	09JAN97	16JAN97	6
320	Pipeline-P43-Tracing/Video/Pressure Testing	18OCT96	22OCT96	3
325	Pipeline-P44-Tracing/Video/Pressure Testing	17JAN97	21JAN97	3
330	Pipeline-P45-Tracing/Video/Pressure Testing	23OCT96	25OCT96	3
335	Pipeline-P46-Tracing/Video/Pressure Testing	22JAN97	24JAN97	3
340	Pipeline-P47-Tracing/Video/Pressure Testing	28OCT96	30OCT96	3
345	Pipeline-P48-Tracing/Video/Pressure Testing	27JAN97	29JAN97	3
350	Pipeline-P49-Tracing/Video/Pressure Testing	31OCT96	04NOV96	3
355	Pipeline-P50-Tracing/Video/Pressure Testing	30JAN97	03FEB97	3
360	Pipeline-P51-Tracing/Video/Pressure Testing	05NOV96	07NOV96	3
365	Pipeline-P52-Tracing/Video/Pressure Testing	04FEB97	06FEB97	3
370	Pipeline-P53-Tracing/Video/Pressure Testing	08NOV96	12NOV96	3
375	Pipeline-P54-Tracing/Video/Pressure Testing	07FEB97	11FEB97	3
380	Pipeline-P55-Tracing/Video/Pressure Testing	13NOV96	15NOV96	3
385	Pipeline-P56-Tracing/Video/Pressure Testing	12FEB97	19FEB97	6
390	Pipeline-P57-Tracing/Video/Pressure Testing	18NOV96	15NOV96	0
395	Pipeline-P58-Tracing/Video/Pressure Testing	20FEB97	24FEB97	3
400	Pipeline-P59-Tracing/Video/Pressure Testing	18NOV96	20NOV96	3
405	Pipeline-P60-Tracing/Video/Pressure Testing	25FEB97	04MAR97	6
410	Pipeline-P61-Tracing/Video/Pressure Testing	21NOV96	25NOV96	3
415	Pipeline-P62-Tracing/Video/Pressure Testing	05MAR97	07MAR97	3
420	Pipeline-P63-Tracing/Video/Pressure Testing	26NOV96	02DEC96	3
425	Pipeline-P64-Tracing/Video/Pressure Testing	10MAR97	12MAR97	3
430	Pipeline-P65-Tracing/Video/Pressure Testing	03DEC96	05DEC96	3
435	Pipeline-P66-Tracing/Video/Pressure Testing	13MAR97	17MAR97	3
440	Finish Tracing/Video/Pressure Testing		17MAR97	0
445	Schedule Reserve	18MAR97	30APR97	30
17 POINT RAD SURVEY				
500	OU 9 OPWL 17 POINT RAD SURVEY	16OCT95	20MAY96	147*
505	Start 17 Point Rad Survey	16OCT95		0



Project Start	01JUL94
Project Finish	10SEP97
Data Date	01JUL94
Plot Date	27OCT94

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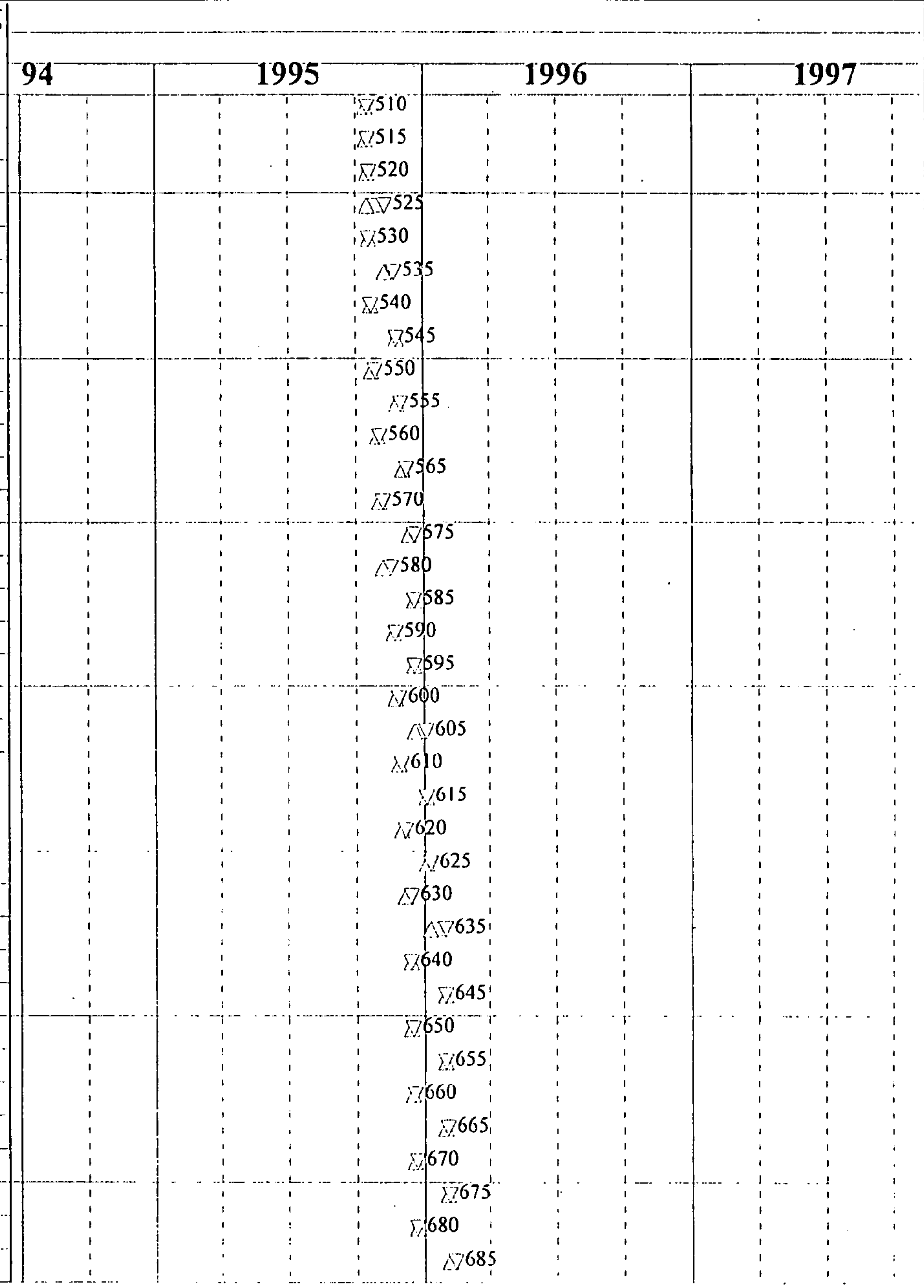
OU9 DETAIL SCHEDULE

OPWL FIELD INVESTIGATION

JE JACOBS ENGINEERING GROUP, INC.

Date	Revision	Checked	Approved

Act ID	Activity Description	Early Start	Early Finish	Orig Dur
510	Pipeline-P01-17 point rad	16OCT95	16OCT95	1
515	Pipeline-P02-17 point rad	16OCT95	16OCT95	1
520	Pipeline-P03-17 point rad	17OCT95	18OCT95	2
525	Pipeline-P04-17 point rad	17OCT95	09NOV95	18
530	Pipeline-P05-17 point rad	19OCT95	20OCT95	2
535	Pipeline-P06-17 point rad	10NOV95	22NOV95	9
540	Pipeline-P07-17 point rad	23OCT95	23OCT95	1
545	Pipeline-P08-17 point rad	27NOV95	22NOV95	0
550	Pipeline-P09-17 point rad	24OCT95	27OCT95	4
555	Pipeline-P10-17 point rad	27NOV95	01DEC95	5
560	Pipeline-P11-17 point rad	30OCT95	31OCT95	2
565	Pipeline-P12-17 point rad	04DEC95	08DEC95	5
570	Pipeline-P13-17 point rad	01NOV95	07NOV95	5
575	Pipeline-P14-17 point rad	11DEC95	18DEC95	6
580	Pipeline-P15-17 point rad	08NOV95	17NOV95	8
585	Pipeline-P16-17 point rad	19DEC95	19DEC95	1
590	Pipeline-P17-17 point rad	20NOV95	21NOV95	2
595	Pipeline-P18-17 point rad	20DEC95	19DEC95	0
600	Pipeline-P19-17 point rad	22NOV95	27NOV95	2
605	Pipeline-P20-17 point rad	20DEC95	03JAN96	5
610	Pipeline-P21-17 point rad	28NOV95	30NOV95	3
615	Pipeline-P22-17 point rad	04JAN96	04JAN96	1
620	Pipeline-P23-17 point rad	01DEC95	06DEC95	4
625	Pipeline-P24-17 point rad	05JAN96	09JAN96	3
630	Pipeline-P25-17 point rad	07DEC95	13DEC95	5
635	Pipeline-P26-17 point rad	10JAN96	29JAN96	14
640	Pipeline-P27-17 point rad	14DEC95	14DEC95	1
645	Pipeline-P28-17 point rad	30JAN96	30JAN96	1
650	Pipeline-P29-17 point rad	15DEC95	15DEC95	1
655	Pipeline-P30-17 point rad	31JAN96	31JAN96	1
660	Pipeline-P31-17 point rad	18DEC95	19DEC95	2
665	Pipeline-P32-17 point rad	01FEB96	01FEB96	1
670	Pipeline-P33-17 point rad	20DEC95	20DEC95	1
675	Pipeline-P34-17 point rad	02FEB96	05FEB96	2
680	Pipeline-P35-17 point rad	21DEC95	21DEC95	1
685	Pipeline-P36-17 point rad	06FEB96	12FEB96	5



Project Start 01JUL94
Project Finish 10SEP97
Data Date 01JUL94
Plot Date 27OCT94

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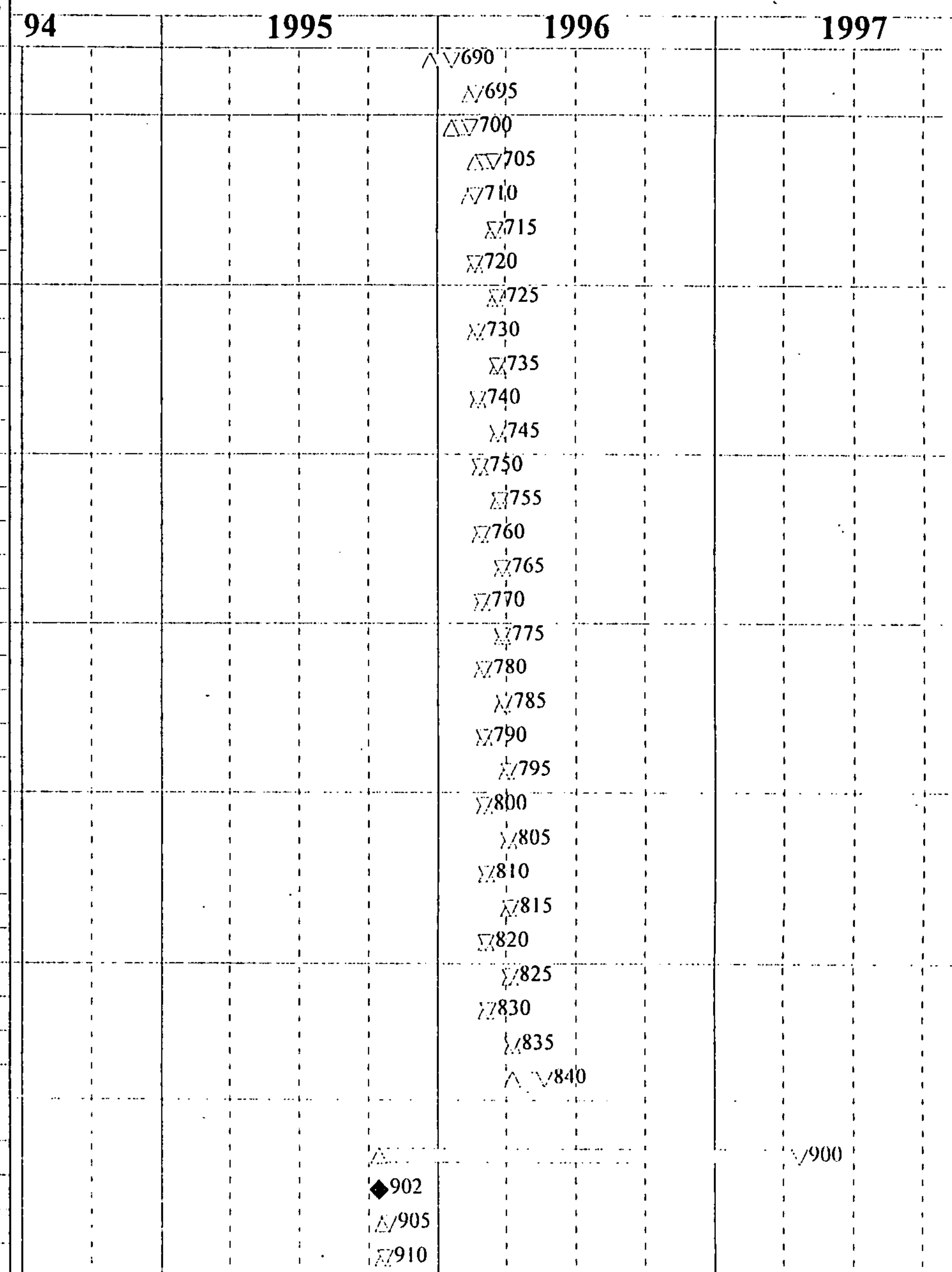
OU9 DETAIL SCHEDULE

OPWL FIELD INVESTIGATION

JE JACOBS ENGINEERING GROUP, INC

Date	Revision	Checked	Approved

Act ID	Activity Description	Early Start	Early Finish	Orig Dur
690	Pipeline-P37-17 point rad	22DEC95	18JAN96	14
695	Pipeline-P38-17 point rad	13FEB96	21FEB96	7
700	Pipeline-P39-17 point rad	19JAN96	13FEB96	18
705	Pipeline-P40-17 point rad	22FEB96	14MAR96	16
710	Pipeline-P41-17 point rad	14FEB96	20FEB96	5
715	Pipeline-P42-17 point rad	15MAR96	18MAR96	2
720	Pipeline-P43-17 point rad	21FEB96	21FEB96	1
725	Pipeline-P44-17 point rad	19MAR96	19MAR96	1
730	Pipeline-P45-17 point rad	22FEB96	22FEB96	1
735	Pipeline-P46-17 point rad	20MAR96	20MAR96	1
740	Pipeline-P47-17 point rad	23FEB96	23FEB96	1
745	Pipeline-P48-17 point rad	21MAR96	21MAR96	1
750	Pipeline-P49-17 point rad	26FEB96	26FEB96	1
755	Pipeline-P50-17 point rad	22MAR96	22MAR96	1
760	Pipeline-P51-17 point rad	27FEB96	27FEB96	1
765	Pipeline-P52-17 point rad	25MAR96	25MAR96	1
770	Pipeline-P53-17 point rad	28FEB96	28FEB96	1
775	Pipeline-P54-17 point rad	26MAR96	26MAR96	1
780	Pipeline-P55-17 point rad	29FEB96	29FEB96	1
785	Pipeline-P56-17 point rad	27MAR96	28MAR96	2
790	Pipeline-P57-17 point rad	01MAR96	29FEB96	0
795	Pipeline-P58-17 point rad	01APR96	01APR96	1
800	Pipeline-P59-17 point rad	01MAR96	01MAR96	1
805	Pipeline-P60-17 point rad	02APR96	03APR96	2
810	Pipeline-P61-17 point rad	04MAR96	04MAR96	1
815	Pipeline-P62-17 point rad	04APR96	04APR96	1
820	Pipeline-P63-17 point rad	05MAR96	05MAR96	1
825	Pipeline-P64-17 point rad	05APR96	05APR96	1
830	Pipeline-P65-17 point rad	06MAR96	06MAR96	1
835	Pipeline-P66-17 point rad	08APR96	08APR96	1
840	Schedule Reserve	09APR96	20MAY96	30
	TEST AREAS			
900	PERFORM OPWL TEST AREA INVESTIGATION	16OCT95	21APR97	375*
902	Start Test Areas Investigation	16OCT95		0
905	Pipeline-P01-2 test areas	19OCT95	26OCT95	6
910	Pipeline-P02-1 test area	19OCT95	23OCT95	3



Project Start 01JUL94
Project Finish 10SEP97
Data Date 01JUL94
Plot Date 27OCT94

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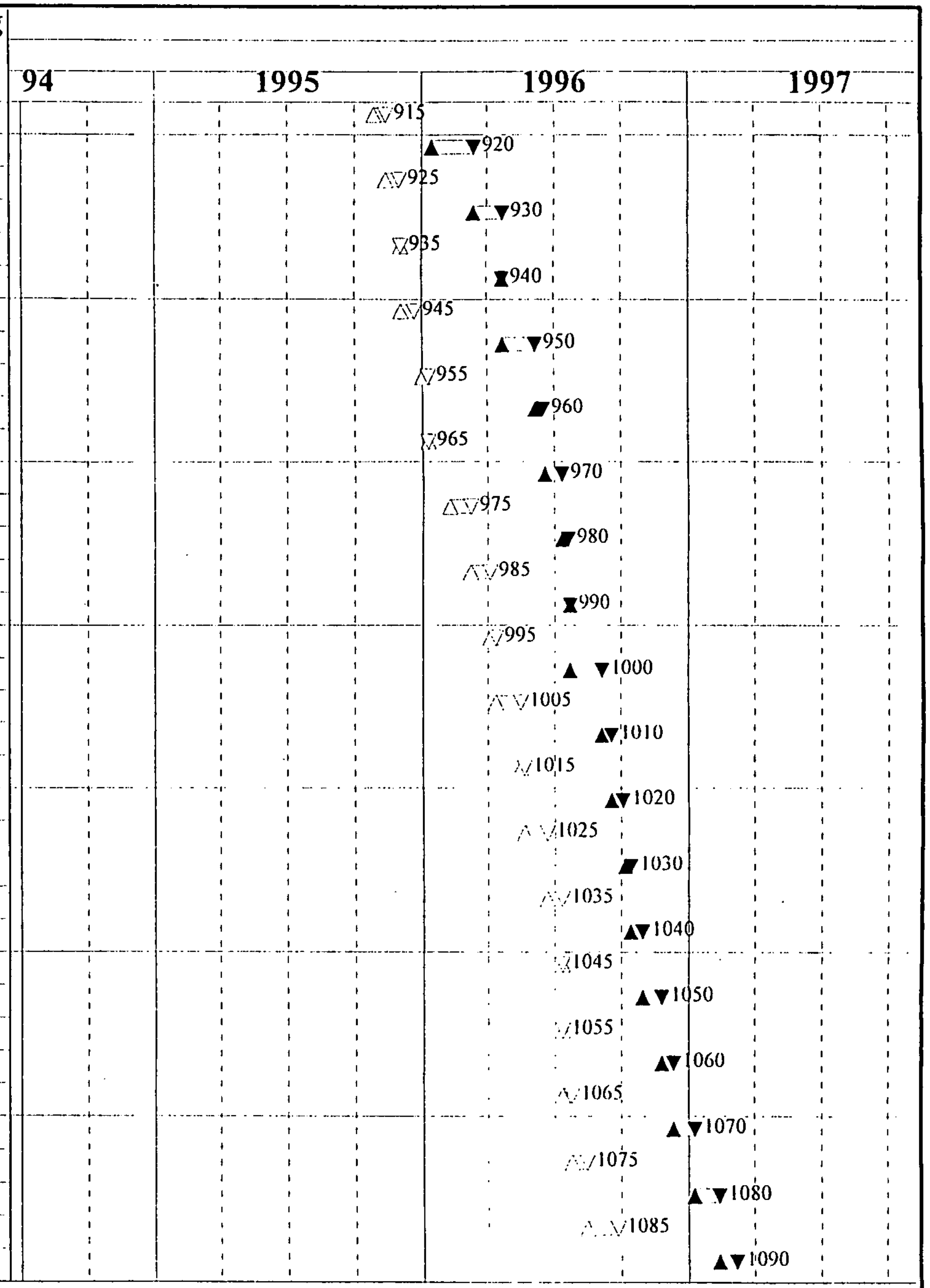
OU9 DETAIL SCHEDULE

OPWL FIELD INVESTIGATION

JACOBS ENGINEERING GROUP, INC.

Date	Revision	Checked	Approved

Act ID	Activity Description	Early Start	Early Finish	Orig Dur
915	Pipeline-P03-4 test areas	27OCT95	13NOV95	12
920	Pipeline-P04-14 test areas	15JAN96	12MAR96	42
925	Pipeline-P05-4 test areas	14NOV95	01DEC95	12
930	Pipeline-P06-9 test areas	13MAR96	19APR96	27
935	Pipeline-P07-0 test areas	04DEC95	01DEC95	0
940	Pipeline-P08-0 test areas	22APR96	19APR96	0
945	Pipeline-P09-5 test areas	04DEC95	22DEC95	15
950	Pipeline-P10-10 test areas	22APR96	03JUN96	30
955	Pipeline-P11-2 test areas	02JAN96	09JAN96	6
960	Pipeline-P12-3 test areas	04JUN96	14JUN96	9
965	Pipeline-P13-0 test areas	10JAN96	09JAN96	0
970	Pipeline-P14-6 test areas	17JUN96	11JUL96	18
975	Pipeline-P15-7 test areas	08FEB96	07MAR96	21
980	Pipeline-P16-2 test areas	12JUL96	19JUL96	6
985	Pipeline-P17-6 test areas	08MAR96	03APR96	18
990	Pipeline-P18-0 test areas	22JUL96	19JUL96	0
995	Pipeline-P19-2 test areas	04APR96	11APR96	6
1000	Pipeline-P20-11 test areas	22JUL96	05SEP96	33
1005	Pipeline-P21-8 test areas	12APR96	15MAY96	24
1010	Pipeline-P22-3 test areas	06SEP96	18SEP96	9
1015	Pipeline-P23-1 test areas	16MAY96	20MAY96	3
1020	Pipeline-P24-4 test areas	19SEP96	04OCT96	12
1025	Pipeline-P25-7 test areas	21MAY96	19JUN96	21
1030	Pipeline-P26-2 test areas	07OCT96	14OCT96	6
1035	Pipeline-P27-5 test areas	20JUN96	11JUL96	15
1040	Pipeline-P28-4 test areas	15OCT96	30OCT96	12
1045	Pipeline-P29-0 test areas	12JUL96	11JUL96	0
1050	Pipeline-P30-6 test areas	31OCT96	25NOV96	18
1055	Pipeline-P31-0 test areas	12JUL96	11JUL96	0
1060	Pipeline-P32-3 test areas	26NOV96	10DEC96	9
1065	Pipeline-P33-3 test areas	12JUL96	24JUL96	9
1070	Pipeline-P34-5 test areas	11DEC96	08JAN97	15
1075	Pipeline-P35-5 test areas	25JUL96	14AUG96	15
1080	Pipeline-P36-8 test areas	09JAN97	11FEB97	24
1085	Pipeline-P37-10 test areas	15AUG96	26SEP96	30
1090	Pipeline-P38-6 test areas	12FEB97	07MAR97	18



Project Start 01JUL94
Project Finish 10SEP97
Data Date 01JUL94
Plot Date 27OCT94

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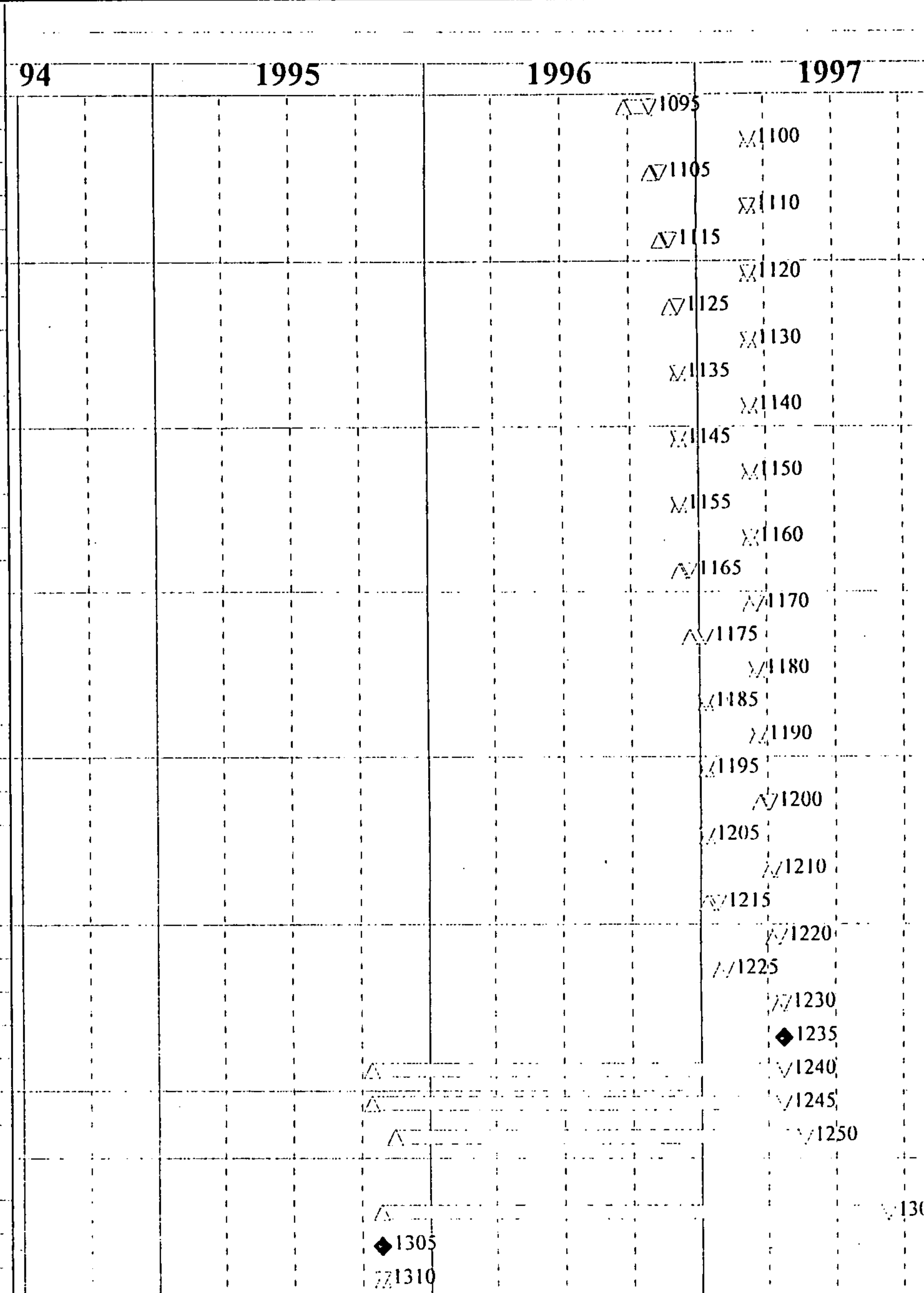
OU9 DETAIL SCHEDULE

OPWL FIELD INVESTIGATION

JE JACOBS ENGINEERING GROUP, INC

Date	Revision	Checked	Approved

Act ID	Activity Description	Early Start	Early Finish	Orig Dur
1095	Pipeline-P39-8 test areas	27SEP96	30OCT96	24
1100	Pipeline-P40-0 test areas	10MAR97	07MAR97	0
1105	Pipeline-P41-3 test areas	31OCT96	12NOV96	9
1110	Pipeline-P42-0 test areas	10MAR97	07MAR97	0
1115	Pipeline-P43-3 test areas	13NOV96	25NOV96	9
1120	Pipeline-P44-0 test areas	10MAR97	07MAR97	0
1125	Pipeline-P45-2 test areas	26NOV96	05DEC96	6
1130	Pipeline-P46-0 test areas	10MAR97	07MAR97	0
1135	Pipeline-P47-0 test areas	06DEC96	05DEC96	0
1140	Pipeline-P48-0 test areas	10MAR97	07MAR97	0
1145	Pipeline-P49-0 test areas	06DEC96	05DEC96	0
1150	Pipeline-P50-0 test areas	10MAR97	07MAR97	0
1155	Pipeline-P51-0 test areas	06DEC96	05DEC96	0
1160	Pipeline-P52-0 test areas	10MAR97	07MAR97	0
1165	Pipeline-P53-3 test areas	06DEC96	18DEC96	9
1170	Pipeline-P54-2 test areas	10MAR97	17MAR97	6
1175	Pipeline-P55-3 test areas	19DEC96	08JAN97	9
1180	Pipeline-P56-0 test areas	18MAR97	17MAR97	0
1185	Pipeline-P57-0 test areas	09JAN97	08JAN97	0
1190	Pipeline-P58-1 test area	18MAR97	20MAR97	3
1195	Pipeline-P59-0 test areas	09JAN97	08JAN97	0
1200	Pipeline-P60-3 test areas	21MAR97	03APR97	9
1205	Pipeline-P61-0 test areas	09JAN97	08JAN97	0
1210	Pipeline-P62-1 test area	04APR97	08APR97	3
1215	Pipeline-P63-4 test areas	09JAN97	24JAN97	12
1220	Pipeline-P64-2 test areas	09APR97	16APR97	6
1225	Pipeline-P65-2 test areas	27JAN97	03FEB97	6
1230	Pipeline-P66-1 test areas	17APR97	21APR97	3
1235	Finish Test Areas		21APR97	0
1240	Test Area Lab Analysis (Non-Rad)	16OCT95	21APR97	375*
1245	Test Area Lab Analysis (Rad)	16OCT95	21APR97	375*
1250	OPWL Data Validation	15NOV95	21MAY97	375
CONFIRMATION SAMPLING				
1300	PERFORM OPWL CONFIRMATION SAMPLING	27OCT95	10SEP97	465*
1305	Start Confirmation Sampling Investigation	27OCT95		0
1310	Pipeline-P01-6 Confirmation Sample Lctns	27OCT95	27OCT95	1



Project Start	01JUL94
Project Finish	10SEP97
Data Date	01JUL94
Plot Date	27OCT94

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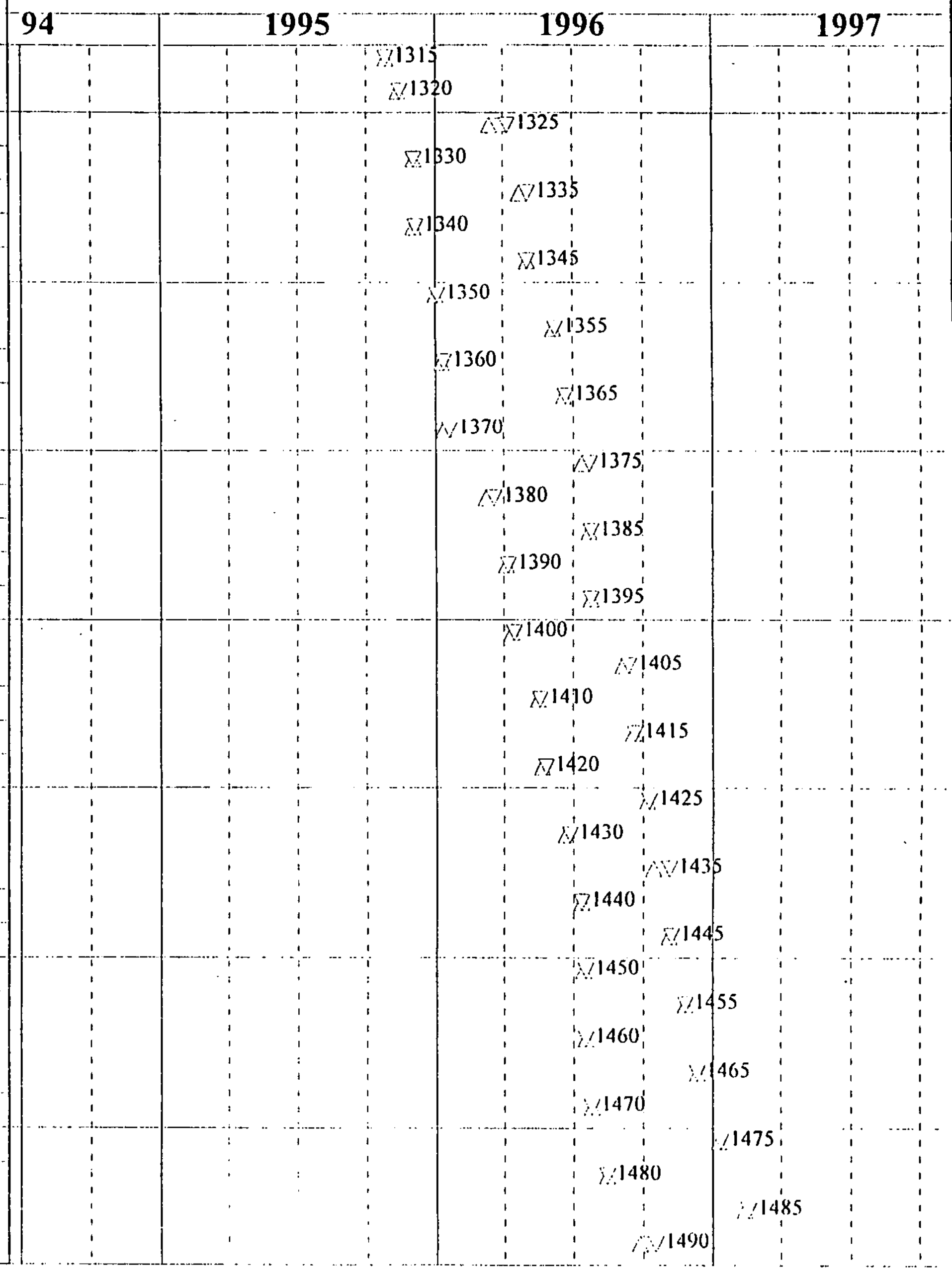
OU9 DETAIL SCHEDULE

OPWL FIELD INVESTIGATION

JE JACOBS ENGINEERING GROUP, INC.

Date	Revision	Checked	Approved

Act ID	Activity Description	Early Start	Early Finish	Orig Dur
1315	Pipeline-P02-0 Confirmation Sample Lctns	27OCT95	26OCT95	0
1320	Pipeline-P03-6 Confirmation Sample Lctns	14NOV95	14NOV95	1
1325	Pipeline-P04-96 Confirmation Sample Lctns	13MAR96	04APR96	16
1330	Pipeline-P05-7 Confirmation Sample Lctns	04DEC95	04DEC95	1
1335	Pipeline-P06-49 Confirmation Sample Lctns	22APR96	01MAY96	8
1340	Pipeline-P07-6 Confirmation Sample Lctns	05DEC95	05DEC95	1
1345	Pipeline-P08-0 Confirmation Sample Lctns	02MAY96	01MAY96	0
1350	Pipeline-P09-20 Confirmation Sample Lctns	02JAN96	04JAN96	3
1355	Pipeline-P10-20 Confirmation Sample Lctns	04JUN96	06JUN96	3
1360	Pipeline-P11-8 Confirmation Sample Lctns	10JAN96	11JAN96	2
1365	Pipeline-P12-24 Confirmation Sample Lctns	17JUN96	20JUN96	4
1370	Pipeline-P13-30 Confirmation Sample Lctns	12JAN96	18JAN96	5
1375	Pipeline-P14-40 Confirmation Sample Lctns	12JUL96	22JUL96	7
1380	Pipeline-P15-42 Confirmation Sample Lctns	08MAR96	18MAR96	7
1385	Pipeline-P16-6 Confirmation Sample Lctns	23JUL96	23JUL96	1
1390	Pipeline-P17-6 Confirmation Sample Lctns	04APR96	04APR96	1
1395	Pipeline-P18-0 Confirmation Sample Lctns	24JUL96	23JUL96	0
1400	Pipeline-P19-6 Confirmation Sample Lctns	12APR96	12APR96	1
1405	Pipeline-P20-22 Confirmation Sample Lctns	06SEP96	11SEP96	4
1410	Pipeline-P21-13 Confirmation Sample Lctns	16MAY96	17MAY96	2
1415	Pipeline-P22-3 Confirmation Sample Lctns	19SEP96	19SEP96	1
1420	Pipeline-P23-16 Confirmation Sample Lctns	21MAY96	24MAY96	4
1425	Pipeline-P24-14 Confirmation Sample Lctns	07OCT96	09OCT96	3
1430	Pipeline-P25-25 Confirmation Sample Lctns	20JUN96	26JUN96	5
1435	Pipeline-P26-85 Confirmation Sample Lctns	15OCT96	04NOV96	15
1440	Pipeline-P27-4 Confirmation Sample Lctns	12JUL96	12JUL96	1
1445	Pipeline-P28-4 Confirmation Sample Lctns	05NOV96	05NOV96	1
1450	Pipeline-P29-7 Confirmation Sample Lctns	15JUL96	15JUL96	1
1455	Pipeline-P30-3 Confirmation Sample Lctns	26NOV96	26NOV96	1
1460	Pipeline-P31-9 Confirmation Sample Lctns	16JUL96	17JUL96	2
1465	Pipeline-P32-3 Confirmation Sample Lctns	11DEC96	11DEC96	1
1470	Pipeline-P33-4 Confirmation Sample Lctns	25JUL96	25JUL96	1
1475	Pipeline-P34-8 Confirmation Sample Lctns	09JAN97	10JAN97	2
1480	Pipeline-P35-4 Confirmation Sample Lctns	15AUG96	15AUG96	1
1485	Pipeline-P36-25 Confirmation Sample Lctns	12FEB97	17FEB97	4
1490	Pipeline-P37-77 Confirmation Sample Lctns	27SEP96	15OCT96	13



Project Start 01JUL94
Project Finish 10SEP97
Data Date 01JUL94
Plot Date 27OCT94

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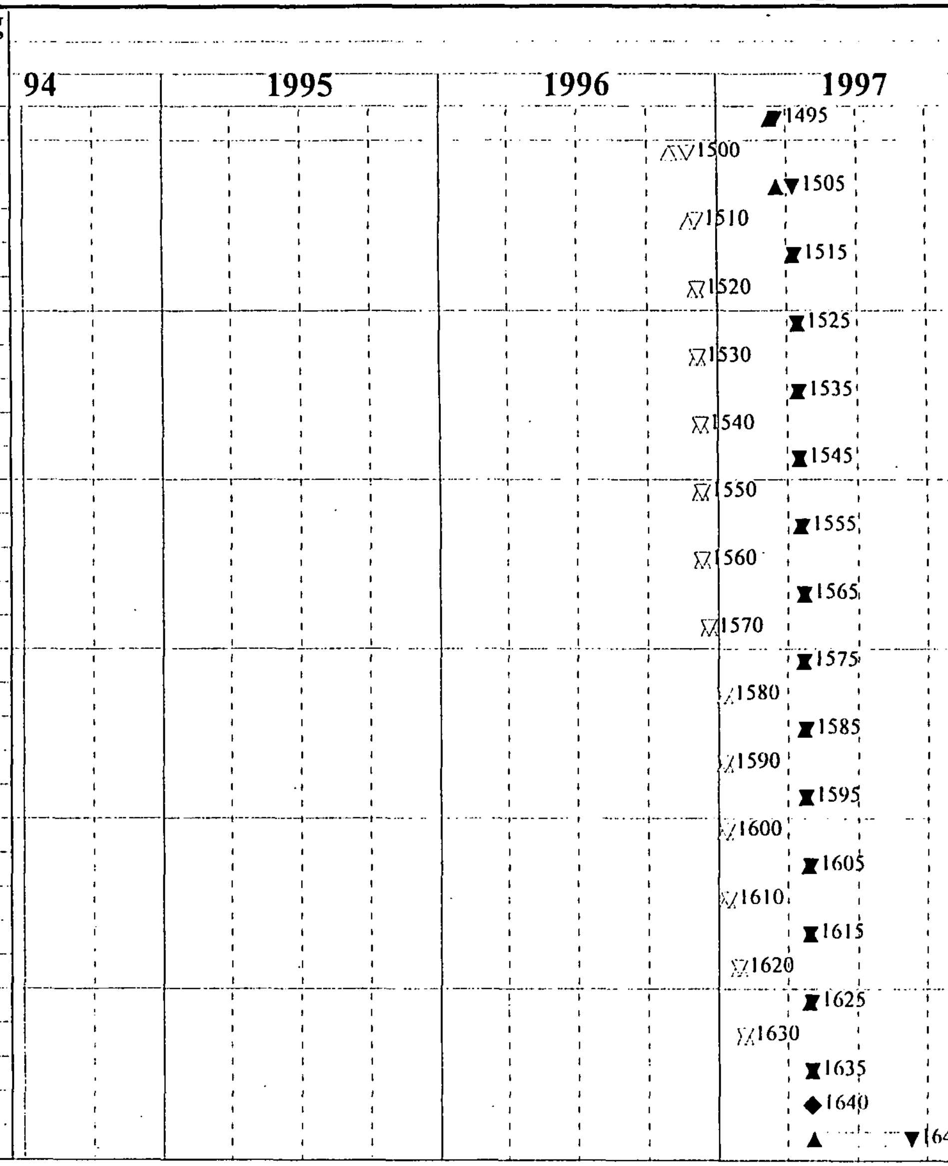
OU9 DETAIL SCHEDULE

OPWL FIELD INVESTIGATION

JE JACOBS ENGINEERING GROUP, INC.

Date	Revision	Checked	Approved

Act ID	Activity Description	Early Start	Early Finish	Orig Dur
1495	Pipeline-P38-37 Confirmation Sample Lctns	10MAR97	17MAR97	6
1500	Pipeline-P39-102 Confirmation Sample Lctns	31OCT96	22NOV96	17
1505	Pipeline-P40-96 Confirmation Sample Lctns	18MAR97	09APR97	16
1510	Pipeline-P41-27 Confirmation Sample Lctns	25NOV96	03DEC96	5
1515	Pipeline-P42-12 Confirmation Sample Lctns	10APR97	11APR97	2
1520	Pipeline-P43-3 Confirmation Sample Lctns	04DEC96	04DEC96	1
1525	Pipeline-P44-7 Confirmation Sample Lctns	14APR97	14APR97	1
1530	Pipeline-P45-3 Confirmation Sample Lctns	06DEC96	06DEC96	1
1535	Pipeline-P46-8 Confirmation Sample Lctns	15APR97	16APR97	2
1540	Pipeline-P47-7 Confirmation Sample Lctns	09DEC96	09DEC96	1
1545	Pipeline-P48-3 Confirmation Sample Lctns	17APR97	17APR97	1
1550	Pipeline-P49-3 Confirmation Sample Lctns	10DEC96	10DEC96	1
1555	Pipeline-P50-2 Confirmation Sample Lctns	18APR97	18APR97	1
1560	Pipeline-P51-2 Confirmation Sample Lctns	11DEC96	11DEC96	1
1565	Pipeline-P52-2 Confirmation Sample Lctns	21APR97	21APR97	1
1570	Pipeline-P53-2 Confirmation Sample Lctns	19DEC96	19DEC96	1
1575	Pipeline-P54-6 Confirmation Sample Lctns	22APR97	22APR97	1
1580	Pipeline-P55-2 Confirmation Sample Lctns	09JAN97	09JAN97	1
1585	Pipeline-P56-8 Confirmation Sample Lctns	23APR97	24APR97	2
1590	Pipeline-P57-0 Confirmation Sample Lctns	10JAN97	09JAN97	0
1595	Pipeline-P58-3 Confirmation Sample Lctns	25APR97	25APR97	1
1600	Pipeline-P59-3 Confirmation Sample Lctns	10JAN97	10JAN97	1
1605	Pipeline-P60-8 Confirmation Sample Lctns	28APR97	29APR97	2
1610	Pipeline-P61-3 Confirmation Sample Lctns	13JAN97	13JAN97	1
1615	Pipeline-P62-2 Confirmation Sample Lctns	30APR97	30APR97	1
1620	Pipeline-P63-3 Confirmation Sample Lctns	27JAN97	27JAN97	1
1625	Pipeline-P64-2 Confirmation Sample Lctns	01MAY97	01MAY97	1
1630	Pipeline-P65-3 Confirmation Sample Lctns	04FEB97	04FEB97	1
1635	Pipeline-P66-2 Confirmation Sample Lctns	02MAY97	02MAY97	1
1640	Finish Confirmation Sample Lctns		02MAY97	0
1645	Schedule Reserve	05MAY97	10SEP97	90



Project Start	01JUL94	Early Bar	1D90
Project Finish	10SEP97	Progress Bar	Sheet 9 of 9
Data Date	01JUL94	Critical Activity	
Plot Date	27OCT94		

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OU9 DETAIL SCHEDULE

OPWL FIELD INVESTIGATION

JE JACOBS ENGINEERING GROUP, INC.

Date	Revision	Checked	Approved

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APPENDIX A

Integrated Operable Unit
Individual Hazardous Substance Site Overlap

TABLE 2.3

POTENTIAL OPWL INTERACTIONS WITH OTHER RFP OPERABLE UNITS

PIPE	LOCATION[1]	POTENTIAL INTERACTION WITH OTHER OUs[2]
P-1	E2	P-1 is partially within IHSS 148 (Waste Spills), OU13. 148 targets nitrate and radionuclide contamination around Building 123, including possible leaks from P-1[a,b]. The IAG[3] specifies a surface radiation survey and analysis of soil boring samples for various radionuclides at 148.
P-2	E2	Beneath Building 123; see P-1 comments.
P-3	E2	West end is within IHSS 148; see P-1 comments.
P-4	E2-E5	West end terminates at OPWL tank location T-3, which is also IHSS 122 (Underground Concrete Tank), OU13. 122 targets suspected leaks from T-3[a,b]. The IAG specifies a surface radiation survey and analysis of soil boring samples for HSL volatiles, various radionuclides and nitrate at 122. This Work Plan proposes that IHSS 122 be incorporated into OU9. Fuel oil from IHSS 129 (Oil Leak), OU10, possibly affects P-4 near its intersection with pipe P-5 north of Building 444. A 120 ft section immediately west of 7th St (including the known P-4 leak area north of Building 663) is overlain by IHSS 117.3 (Chemical Storage, South Site), OU13. 117.3 was used for storage of pallets, cargo containers, new drums, and possibly nonradioactive chemicals[a,b]. The IAG specifies a soil gas survey of 117.3, with soil borings and alluvial monitoring wells where the survey detects contamination. A 50 ft section beneath 8th St. is overlain by IHSS 162 (Radioactive Site #2 - 700 Area), OU14. 162 targets several radioactive hotspots detected in 1974 in the pavement of 8th St[a,b]. The IAG requires that these hotspots be located, presumably by a surface radiation survey.
P-5	E3, F3	South end of outdoor section is within IHSS 157.2 (Radioactive Site - South Area), OU12. 157.2 targets suspected uranium and beryllium contamination around Building 444[a,b]. The IAG specifies a surface radiation survey and analysis of soil boring samples for HSL volatiles, various radionuclides and beryllium at 157.2.
P-6	E5, F5	A 100 ft section NW of Building 881 is within IHSS 164.1 (Radioactive Site #2 - 800 Area; Concrete Slab), OU14. 164.1 targets suspected radioactive contamination from a concrete slab which was demolished and removed from the site in 1958[a,b]. The IAG specifies a surface radiation survey and analysis of soil boring samples for HSL volatiles, HSL semi-volatiles and various radionuclides at 164.1.

.TABLE 2.3

POTENTIAL OPWL INTERACTIONS WITH OTHER RFP OPERABLE UNITS (Continued)

PIPE	LOCATION[1]	POTENTIAL INTERACTION WITH OTHER OUs[2]
P-7	F5	Outdoor section south of Building 881 is possibly within IHSS 177 (Building 885 Drum Storage Area), OU15, and may also be affected by hydrocarbon contamination from IHSS 107 (Hillside Oil Leak), OU1. Numerous monitoring wells and boreholes have been completed downgradient of P-7 in conjunction with the 881 Hillside RI.
P-8	F5	P-8 parallels and is immediately adjacent to P-7; see P-7 comments.
P-9	E5	None
P-10	E5	None
P-11	D5, E5	North end terminates at IHSS 147.1 (Process Waste Leaks - Maas Area), OU12. 147.1 targets suspected process waste line leaks, possibly including leaks from P-11[a, b]. The IAG specifies analysis of soil boring samples for HSL volatiles, nitrate, and various radionuclides and metals at 147.1. This Work Plan proposes that IHSS 147.1 be incorporated into OU9.
P-12	D5	South half is within IHSS 147.1 (Process Waste Leaks - Maas Area), OU12. 147.1 targets suspected process waste line leaks from P-12 and/or P-13[a, b]. The IAG specifies soil borings along the pipe alignment drilled on 20 ft centers to a depth 5 ft below the pipe invert. Soil samples from the borings are to be analyzed for HSL volatiles, nitrate, and various radionuclides and metals. This Work Plan proposes that IHSS 147.1 be incorporated into OU9. North end terminates at IHSS 123.2 (Original Valve Vault 7 Location), OU8, a site of known historical process waste leaks[a, b]. The IAG specifies a surface radiation survey and analysis of soil boring samples for HSL volatiles, various radionuclides, beryllium, nitrate and fluoride at 123.2. This Work Plan proposes that IHSS 123.2 be incorporated into OU9. North end is also within IHSS 150.5 (Radioactive Liquid Leaks West of Building 707), OU8. 150.5 targets suspected process waste leaks from pipelines beneath the area[a, b]. The IAG specifies a surface radiation survey and analysis of soil boring samples for HSL volatiles and various radionuclides, metals and inorganic compounds at 150.5.
P-13	D5	P-13 parallels and is immediately adjacent to P-12; see P-12 comments.
P-14	C5	Southwest end is within IHSS 150.5 and terminates in IHSS 123.2; see P-12 comments.

TABLE 2.3

POTENTIAL OPWL INTERACTIONS WITH OTHER RFP OPERABLE UNITS
(Continued)

PIPE	LOCATION[1]	POTENTIAL INTERACTION WITH OTHER OUs[2]
P-15	C5	South end is within IHSS 150.5 and terminates in IHSS 123.2; see P-12 comments. East-west section between Buildings 707 and 778 possibly is affected by IHSS 118.2 (Multiple Solvent Spills), OU8. 118.2 targets suspected releases from an aboveground carbon tetrachloride tank on the north side of Building 707[a, b]. The IAG specifies a soil gas survey and analysis of soil boring samples for HSL volatiles and various radionuclides at 118.2.
P-16	C4, C5	A 50 ft section beneath 8th St. is within IHSS 162 (Radioactive Site #2 - 700 Area), OU14. 162 targets several radioactive hotspots detected in 1974 in the pavement of 8th St[a, b]. The IAG requires that these hotspots be located, presumably by a surface radiation survey.
P-17	C4	IHSS 159 (Radioactive Site - Building 559), OU8, targets historical leaks from the section of P-17 immediately east of Building 559[a, b]. The IAG specifies a surface radiation survey and analysis of soil boring samples for HSL volatiles and various radionuclides and metals at 159. This Work Plan proposes that IHSS 159 be incorporated into OU9.
P-18	C4	IHSS 197 (Scrap Metal Sites), OU16, is just west of P-18, but is not expected to be a significant source of contamination[a].
P-19	C5, D5	None
P-20	B5, C5	None

TABLE 2.3

POTENTIAL OPWL INTERACTIONS WITH OTHER RFP OPERABLE UNITS
(Continued)

PIPE	LOCATION[1]	POTENTIAL INTERACTION WITH OTHER OUs[2]
P-21	B5	North end is within IHSS 150.3 (Radioactive Liquid Leaks Between Buildings 771 and 774), OU8. 150.3 targets suspected leaks from various OPWL pipes and tanks[a, b], possibly including P-21. The IAG specifies a surface radiation survey and analysis of soil boring samples for HSL volatiles and various radionuclides, metals and inorganic compounds at 150.3. P-21 terminates at OPWL tank locations T-15 and T-17, which are also IHSS 146 (Concrete Process Waste Tanks), OU8. The six tanks at this site were removed in 1970. Numerous process waste releases reportedly occurred from the tanks while they were in service[a, b]. The IAG specifies a surface radiation survey and analysis of soil boring samples for HSL volatiles, HSL semi-volatiles, and various radionuclides, metals and inorganic compounds at 146. This work Plan proposes that IHSS 146 be incorporated into OU9. South end is within IHSS 137 (Cooling Tower Blowdown, Building 774), OU8. 137 targets suspected cooling tower blowdown water spills, which may have contained chromate[a, b]. The IAG specifies analysis of soil boring samples for total chromium at 137.
P-22	B5	Most of P-22 is within IHSS 150.1 (Radioactive Liquid Leaks North of Building 771), OU8. 150.1 targets process waste leaks and numerous other historical releases immediately north of Building 771[a, b]. The IAG specifies a surface radiation survey and analysis of soil boring samples for HSL volatiles and various radionuclides, metals and inorganic compounds at 150.1. P-22 terminates at OPWL tank location T-8, which is also IHSS 126 (Out-of-Service Process Waste Tanks), OU8. 126 targets suspected leaks from the two process waste tanks at T-8[a, b]. The IAG specifies analysis of soil boring samples for HSL volatiles, various radionuclides, beryllium and nitrate at 126. An alluvial ground water monitoring well north of IHSS 126 is also specified. This Work Plan proposes that IHSS 126 be incorporated into OU9.
P-23	B4, B5	Section north of Building 771 is within IHSS 150.1 and terminates at IHSS 126; see P-22 comments. South end of the section west of Building 771 is within IHSS 150.2 (Radioactive Liquid Leaks West of Building 771), OU8. 150.2 targets releases from past fires in Buildings 771 and 776, including a 1957 fire which radioactively contaminated the area southwest of Building 771[a, b]. The IAG specifies a surface radiation survey and analysis of soil boring samples for HSL volatiles and various radionuclides, metals and inorganic compounds at 150.2.

TABLE 2.3

POTENTIAL OPWL INTERACTIONS WITH OTHER RFP OPERABLE UNITS (Continued)

PIPE	LOCATION[1]	POTENTIAL INTERACTION WITH OTHER OUs[2]
P-24	B5	P-24 is within IHSS 150.1 and terminates at IHSS 126; see P-22 comments.
P-25	B5	Section of P-25 is within IHSS 150.3 (Radioactive Liquid Leaks Between Buildings 771 and 774), OU8. 150.3 targets leaks from various OPWL pipes and tanks[a, b], possibly including P-21. The IAG specifies a surface radiation survey and analysis of soil boring samples for HSL volatiles and various radionuclides, metals and inorganic compounds at 150.3. The southernmost section of P-25 is within IHSS 127 (Low-Level Radioactive Waste Leak), OU8. 127 targets a reported release from the process waste line between Buildings 774 and 995 (most likely P-28 or P-29)[a, b]. The IAG specifies a surface radiation survey and analysis of soil boring samples for various radionuclides and nitrate at 127. This Work Plan proposes that IHSS 127 be incorporated into OU9.
P-26	B5, B6	IHSS 149 (Effluent Pipe), OU8 targets a 1980 leak from P-26 just east of Building 774, near the west end of the pipe[a, b]. The IAG specifies a surface radiation survey and analysis of soil boring samples for HSL volatiles, nitrate, and various radionuclides and metals at 149. This Work Plan proposes that IHSS 149 be incorporated into OU9. Most of P-26 is immediately north (downgradient) of IHSS 101 (Solar Evaporation Ponds), OU4, and most likely is affected by contamination from the ponds.
P-27	B5	North end terminates at OPWL tank locations T-14 and T-16, which are also IHSSs 124 (Radioactive Liquid Waste Storage Tanks), OU10, and 125 (Holding Tank), OU8. IHSSs 124.1 and 125 are the same tank. IHSSs 124 and 125 target releases from three process waste tanks on the east side of Building 774. The IAG specifies a surface radiation survey and analysis of soil boring samples for HSL volatiles, HSL semi-volatiles, and various radionuclides, metals and inorganic compounds at 125. Two alluvial ground water monitoring wells downgradient of IHSS 125 are also specified. This Work Plan proposes that IHSSs 124 and 125 be incorporated into OU9.
P-28	B5	P-28 is within IHSS 127 (Low-Level Radioactive Waste Leak), OU8. 127 targets a reported release from the process waste line between Buildings 774 and 995 (most likely P-28 or P-29)[a, b]. The IAG specifies a surface radiation survey and analysis of soil boring samples for various radionuclides and nitrate at 127. This Work Plan proposes that IHSS 127 be incorporated into OU9.

TABLE 2.3

POTENTIAL OPWL INTERACTIONS WITH OTHER RFP OPERABLE UNITS (Continued)

PIPE	LOCATION[1]	POTENTIAL INTERACTION WITH OTHER OUs[2]
P-29	B5	South end is within IHSS 127; see P-28 comments. North end terminates at OPWL tank locations T-14 and T-16; see P-27 comments.
P-30	B5, C5	North end terminates at OPWL tank locations T-9 and T-10, which are also IHSS 132 (Radioactive Site #4 - 700 Area), OU8. 132 targets suspected leaks from these tanks[a, b]. The IAG specifies analysis of soil boring samples for nitrate and various radionuclides at 132. This Work Plan proposes that IHSS 132 be incorporated into OU9. North end also terminates at IHSS 131 (Radioactive Site #1 - 700 Area), OU14. 131 targets an area north and/or west of Building 776 (the precise location has not been determined) contaminated by plutonium during a 1969 fire[a, b]. The IAG specifies analysis of soil boring samples for various radionuclides at 131.
P-31	B5	P-31 is within 150.3 (Radioactive Liquid Leaks Between Buildings 771 and 774), OU8. 150.3 targets historical leaks from various OPWL tanks and pipes, including a leak in 1971 resulting from excavation of P-31 and P-56 during construction activities[a, b]. The IAG specifies a surface radiation survey and analysis of soil boring samples for HSL volatiles and various radionuclides, metals, and inorganic compounds at 150.3.
P-32	B5, C5	North end terminates within IHSSs 131 and 132; see P-30 comments. East-west section between Buildings 776 and 778 is within IHSS 150.7 (Radioactive Liquid Leak South of Building 776), OU8. 150.7 targets an area contaminated by plutonium during a 1969 fire in Building 776[a, b]. The IAG specifies a surface radiation survey and analysis of soil boring samples for HSL volatiles and various radionuclides, metals, and inorganic compounds at 150.7.
P-33	B5	None

TABLE 2.3

POTENTIAL OPWL INTERACTIONS WITH OTHER RFP OPERABLE UNITS (Continued)

PIPE	LOCATION[1]	POTENTIAL INTERACTION WITH OTHER OUs[2]
P-34	B5	North section is within IHSS 150.3; see P-31 comments. Overlain in part by OPWL tank locations T-15 and T-17, which are also IHSS 146 (Concrete Process Waste Tanks), OU8. The six tanks at this site were removed in 1970. Numerous process waste releases reportedly occurred from the tanks while they were in service[a, b]. The IAG specifies a surface radiation survey and analysis of soil boring samples for HSL volatiles, HSL semi-volatiles, and various radionuclides, metals and inorganic compounds at 146. This Work Plan proposes that IHSS 146 be incorporated into OU9.
P-35	B5	West end terminates at IHSS 127 (Low-Level Radioactive Waste Leak), OU8. 127 targets a reported process waste release from the process waste line between Buildings 774 and 995[a, b]. The IAG specifies a surface radiation survey and analysis of soil boring samples for various radionuclides and nitrate at 127. This Work Plan proposes that IHSS 127 be incorporated into OU9. East end terminates at Pond 207-C of IHSS 101 (Solar Evaporation Ponds), OU4. 101 targets known releases of nitrates and other chemical contaminants from the ponds[a, b]. These releases most likely have affected soils around the east end of P-35.
P-36	B5, B6	P-36 lies along the south side of Pond 207-C and terminates at Pond 207-A of IHSS 101 (Solar Evaporation Ponds), OU4. Releases of nitrates and other chemical contaminants from the ponds most likely have affected soils around the east end of P-36, and possibly also along the section south of 207-C, although ground water flow is towards the ponds from this location.
P-37	B5, B6, C5, C6	East end terminates within IHSSs 131 and 132; see P-30 comments. Sections of P-37 are immediately west and south of Ponds 207-A and 207-B of IHSS 101 (Solar Evaporation Ponds), OU4. Releases of nitrates and other chemical contaminants from the ponds may have affected soils along these sections, although ground water flow is towards the ponds from these locations. A section of P-37 south of Building 779 is within IHSS 150.6 (Radioactive Liquid Leak South of Building 779), OU8. 150.6 targets radioactive contamination from a 1969 waste drum leak in Building 779[a, b]. The IAG specifies a surface radiation survey and analysis of soil boring samples for HSL volatiles and various radionuclides, metals, and inorganic compounds at 150.6.

TABLE 2.3

POTENTIAL OPWL INTERACTIONS WITH OTHER RFP OPERABLE UNITS
(Continued)

PIPE	LOCATION[1]	POTENTIAL INTERACTION WITH OTHER OUs[2]
P-38	B5, B6, C6	A section of P-38 lies immediately west of Pond 207-A of IHSS 101 (Solar Evaporation Ponds), OU4. Releases of nitrates and other chemical contaminants from the ponds may have affected soils along this section, although ground water flow is towards the ponds from this location.
P-39	C6-C8	A section of P-39 lies immediately south of IHSS 101 (Solar Evaporation Ponds), OU4. Releases of nitrates and other chemical contaminants from the ponds may have affected soils along this section of P-39, although ground water flow is towards the ponds from this location. A section of P-39 is immediately south of IHSS 176 (S&W Contractor Storage Yard), OU10. Detailed information about 176 is not given in available references.
P-40	C7, C8	East end terminates at Pond B-2 of IHSS 142 (Retention Ponds), OU6. Past studies of the holding ponds have documented radionuclide accumulation (primarily plutonium) in bottom sediments[a, b]. The IAG specifies analysis of sediment and water samples for HSL volatiles, HSL semi-volatiles, various radionuclides and metals, and nitrate at 142.
P-41	B5, B6, C6	West end of east-west section terminates within IHSSs 131 and 132; see P-30 comments. South end of north-south section between Buildings 777 and 779 is possibly affected by low-level radioactive contamination from IHSS 144 (Sewer Line Break), OU8. 144 targets suspected radioactive contamination from a sanitary sewer line break[a, b].
P-42	B5, C5	South end between Buildings 777 and 779 is possibly affected by low-level radioactive contamination from IHSS 144 (Sewer Line Break), OU8. 144 targets suspected contamination from a sanitary sewer line break[a, b].
P-43	B5	IHSS 137 (Cooling Tower Blowdown, Building 774) is immediately west of P-43. Possible cooling tower blowdown water releases from this site may have contaminated soils around P-43 with low levels of chromate[a, b].
P-44	B5	P-44 parallels and is immediately adjacent to P-43; see P-43 comments.
P-45	B5	None
P-46	B5	P-46 parallels and is immediately adjacent to P-35; see P-35 comments.
P-47	B6	P-47 is entirely within IHSS 101 (Solar Evaporation Ponds), OU4. Soils surrounding P-47 have most likely been contaminated by releases from the ponds[a, b].

TABLE 2.3

POTENTIAL OPWL INTERACTIONS WITH OTHER RFP OPERABLE UNITS
(Continued)

PIPE	LOCATION[1]	POTENTIAL INTERACTION WITH OTHER OUs[2]
P-48	B6	P-48 is entirely within IHSS 101; see P-47 comments.
P-49	B6	P-49 is entirely within IHSS 101; see P-47 comments.
P-50	B6	P-50 is entirely within IHSS 101; see P-47 comments.
P-51	C5	None (inside Building 778).
P-52	E3	None
P-53	F5	P-53 parallels and is immediately adjacent to P-7; see P-7 comments.
P-54	F5	N end terminates at IHSS 145 (Sanitary Waste Line Leak), OU1. 145 targets an area of possible low-level radioactive contamination from a 1981 sewer line leak at the SW corner of Building 881[a, b]. The draft OU1 Phase III RI/FS Work Plan indicates that no hazardous or radioactive contaminants were released as a result of this leak, and that no further investigation of the site is necessary.
P-55	F5	P-55 parallels and is immediately adjacent to P-7; see P-7 comments.
P-56	B5	P-56 parallels and is immediately adjacent to P-31; see P-31 comments.
P-57	E2	East end terminates at IHSS 148 (Waste Spills), OU13. 148 targets nitrate and radionuclide contamination around Building 123[a, b]. The IAG specifies a surface radiation survey and analysis of soil boring samples for various radionuclides at 148.

TANK	LOCATION[1]	POTENTIAL INTERACTION WITH OTHER OUs[2]
T-1	E2	None
T-2	E2	T-2 and T-3, a single, interconnected group of tanks, are also IHSS 122 (Underground Concrete Tanks), OU13. 122 targets suspected leaks from T-2 and T-3[a, b]. The IAG specifies a surface radiation survey and analysis of soil boring samples for HSL volatiles, nitrate, and various radionuclides at 122. This Work Plan proposes that IHSS 122 be incorporated into OU9.
T-3	E2	T-2 and T-3 are a single, interconnected group of tanks; see T-2 comments.
T-4	F3	T-4 is inside Building 447, which is within IHSS 157.2 (Radioactive Site, South Area), OU12. 157.2 targets contaminated soils around Building 447[a, b]. The IAG specifies a surface radiation survey and analysis of soil boring samples for HSL volatiles, beryllium, bis (2-ethylhexyl) phthalate, and various radionuclides at 157.2.

TABLE 2.3

POTENTIAL OPWL INTERACTIONS WITH OTHER RFP OPERABLE UNITS
(Continued)

TANK	LOCATION[1]	POTENTIAL INTERACTION WITH OTHER OUs[2]
T-5	E3	T-5 is inside Building 444, which is within IHSS 157.2 ; see T-4 comments. The T-5 tanks are active, permitted RCRA waste units.
T-6	E3	T-6 is inside Building 444, which is within IHSS 157.2 ; see T-4 comments.
T-7	C4	IHSS 159 (Radioactive Site - Building 559), OU8, is immediately north of T-7. 159 targets process waste leaks from pipelines on the east side of Building 559[a,b]. These pipelines transferred process waste to T-7 from 559. The IAG specifies a surface radiation survey and analysis of soil boring samples for HSL volatiles and various radionuclides and metals at 159. This Work Plan proposes that IHSS 159 be incorporated into OU9.
T-8	B5	T-8 is also IHSS 126 (Out-of-Service Process Waste Tanks), OU8. 126 targets suspected leaks from T-8[a,b]. The IAG specifies analysis of soil boring samples for HSL volatiles, various radionuclides, beryllium and nitrate at 126. An alluvial ground water monitoring well north of the 126 site is also specified. This Work Plan proposes that IHSS 126 be incorporated into OU9.
T-9, T-10	B5	T-9 and T-10 are also IHSS 132 (Radioactive Site #4 - 700 Area), OU8. 132 targets suspected leaks from T-9 and T-10[a,b]. The IAG specifies analysis of soil boring samples for nitrate and various radionuclides at 132. This Work Plan proposes that IHSS 132 be incorporated into OU9. T9 and T10 are possibly located within IHSS 131 (Radioactive Site #1 - 700 Area), OU14. 131 targets an area north and/or west of Building 776 (the precise location has not been determined) contaminated by plutonium during a 1969 fire[a,b]. The IAG specifies analysis of soil boring samples for various radionuclides at 131. IHSS 118.1 (Multiple Solvent Spills West of Building 730), OU8, is located immediately west of the building which houses T9 and T10. 118.1 is the former location of an underground carbon tetrachloride storage tank which may have leaked during its operating history. The tank was removed in 1981[a,b]. The IAG specifies a soil gas survey of 118.1, with soil borings where the survey detects contamination.
T-11, T-30	C5	None (T-11 and T-30 are active, permitted RCRA waste units)
T-12	B5	Not a valid OPWL tank location

TABLE 2.3

POTENTIAL OPWL INTERACTIONS WITH OTHER RFP OPERABLE UNITS (Continued)

TANK	LOCATION[1]	POTENTIAL INTERACTION WITH OTHER OUs[2]
T-13	B5	T-13 is located inside Building 774. IHSS 215 (Units 55.13 - 55.16; Tanks T40, T66, T67, and T68), OU15, targets three process waste tanks east of 774 (T66, T67, and T68; see T-14, T-16 comments below) as well as a fourth tank (T40) at an unknown location inside 774. It is possible that T40 is T-13 or is located near T-13. More detailed information about IHSS 215 is not given in available references.
T-14, T-16	B5	T-14 and T-16 consist of three inactive process waste tanks (designated T66, T67, and T68) located on the east side of Building 774. Two other IHSSs also address these tanks. IHSS 124 (Radioactive Liquid Waste Storage Tanks), OU10, is comprised of three subparts (124.1, 124.2, and 124.3) which target T66, T67, and T68, respectively. IHSS 125 (Holding Tank), OU8, also targets tank T66. This Work Plan proposes that IHSSs 124 and 125 be incorporated into OU9.
T-15, T-17	B5	T-15 and T-17 are also IHSS 146 (Concrete Process Waste Tanks), OU8. 146 targets releases from the six former process waste tanks which were removed in 1972[a,b]. The IAG specifies a surface radiation survey and analysis of soil boring samples for HSL volatiles, HSL semi-volatiles, and various radionuclides, metals and inorganic compounds at 146. This Work Plan proposes that IHSS 146 be incorporated into OU9.
T-18	C5	None
T-19, T-20, T-38	C5	None
T-21, T-22	E5	IHSS 164.2 (Building 886 Radioactive Spills), OU14, targets uranium contamination in soil around and beneath Building 886[a,b]. 164.2 appears on location maps to focus on the eastern side of 886, whereas T-21 and T-22 are immediately west of 886. The IAG specifies a surface radiation survey and analysis of soil boring samples for HSL volatiles, HSL semi-volatiles and various radionuclides at 164.2.
T-23	E5	Both T-23 and IHSS 179 (Building 865 Drum Storage Area), OU15, are inside Building 865. Available references do not give the exact location of IHSS 179 or other detailed information about the site.
T-24, T-32	F5	T-24 and T-32 are possibly affected by IHSSs 106 (Outfall) and 107 (Hillside Oil Leak), OU1. Numerous monitoring wells and boreholes have been completed in the vicinity of T-24 and T-32 in conjunction with the 881 Hillside RI. T-24 and T-32 are active, permitted RCRA waste units.

TABLE 2.3

POTENTIAL OPWL INTERACTIONS WITH OTHER RFP OPERABLE UNITS
(Continued)

TANK	LOCATION[1]	POTENTIAL INTERACTION WITH OTHER OUs[2]
T-25, T-26	E5	T-25, T-26, and IHSS 180 (Building 883 Drum Storage Area), OU15, are inside Building 883. Available references do not give the exact location of 180 or other detailed information about the site. T-25 and T-26 are active, permitted RCRA waste units.
T-27	E5	T-27 is immediately adjacent to T-21 and T-22; see T-21, T-22 comments.
T-28	E5	None
T-29	B5	Chromate contamination related to IHSS 137 (Cooling Tower Blowdown, Building 774), OU8, may affect soils on the northwest side of T29.
T-31	C7	Not a valid OPWL tank location
T-33, T-34	C4	Not valid OPWL tank locations
T-35	C4	T-35 is located inside Building 528. IHSS 159 (Radioactive Site - Building 559), OU8, immediately north of 528, targets leaks from pipelines which transferred process waste from 559 to 528[a, b]. The IAG specifies a surface radiation survey and analysis of soil boring samples for HSL volatiles and various radionuclides and metals at 159. This Work Plan proposes that IHSS 159 be incorporated into OU9.
T-36, T-37	B5	None
T-39	F5	Both T-39 and IHSS 178 (Building 881 Drum Storage Area), OU15, are inside Building 881. Available references do not give the exact location of 178 or other detailed information about the site.

1 See Plate I, Original Process Waste Lines Location Map

2 RFP Operable Units have been designated as follows (DOE, 1991a):

OU1	881 Hillside	OU9	Original Process Waste Lines (OPWL)
OU2	903 Pad	OU10	Other Outside Closures (OOC)
OU3	Off-Site Releases	OU11	West Spray Field
OU4	Solar Ponds	OU12	400/800 Area
OU5	Woman Creek	OU13	100 Area
OU6	Walnut Creek	OU14	Radioactive Sites
OU7	Present Landfill	OU15	Inside Building Closures
OU8	700 Area	OU16	Low Priority Sites

TABLE 2.3

POTENTIAL OPWL INTERACTIONS WITH OTHER RFP OPERABLE UNITS
(Continued)

3 Rocky Flats Interagency Agreement (DOE 1991a)

References

a DOE 1986a.

b Rockwell International, "Appendix I: RCRA 3004(u) Waste Management Units, Volume 1," CODO78343407, Revision 0, 17 October 1986.

APPENDIX B

OU9 Manhole Investigation - March 1994

OU 9 MANHOLE INVESTIGATIONS
MARCH 1994

Non-intrusive investigations of manholes, lampholes, and valve vaults along the old process waste lines were needed to verify pipeline locations. The non-intrusive investigation included lifting the manhole covers and shining a flashlight inside to verify the presence of pipelines. Twenty-two manholes, four lampholes, and six valve vaults were identified for non-intrusive investigation.

During the investigation, it was difficult to see down into the manholes/lampholes/valve vaults due to various debris at the bottom and poor visibility. Because of health and safety concerns (confined space entry), the plane of the surface of the manhole could not be broken, which limited the use of intrusive techniques to fully investigate the manholes. Therefore, these results are preliminary and subsequent investigations may provide different information.

The following designations apply to the sample locations:

- MH - Manhole
- LH - Lamphole
- VV - Valve vault.

100 AREA

OU9-MH-1 3-16-94. South of the western section of Building 123. Pipelines: P-1. Note: line partially active (new PWTS).

Other information: The line runs north to south and appears to be an active line.

OU9-MH-2 3-16-94. South of the eastern section of Building 123 at P-1/P-2/P-3 intersection. Pipelines: P-1, P-2, P-3.

Other information: The manhole located on the west side of the southeast corner of Building 123, P-1/P-2/P-3 intersection was opened.

One pipe enters the manhole from the west, one from the north, one from the south, and one from the east. All are cut off and filled with cement.

OU9-MH-3	3-16-94 East of Building 123, southernmost manhole. Pipelines: P-3.
	Other information: The southernmost manhole has an open channel pipe that runs from west to east and curves to the north.
OU9-MH-4	3-16-94 East of Building 123, northernmost manhole. Pipelines: P-3.
	Other information: The northern-most manhole is brick lined with a pipe appearing to be a 4-inch clay pipe than runs north to south with a T to the east. The northern section of the pipe T has a gate to control the flow to the north.
T-2 Vault	3-16-94. South of Building 441. The manhole located at T-2 and T-3 was opened. The two other manholes here have been locked with a padlock. The middle manhole was opened to view the middle vault. The vault is approximately 5-feet deep. There is approximately 2 to 3 feet of water in the vault. Two pipes enter from the north and lead to a T that goes to the southern vault.
OU9-MH-5	3-16-94. South of Building 452. At P-4/P-5 intersection. Pipelines: P-4, P-5.
	Other information: Investigators tried to open the manhole located south of Building 452, P-4/P-5 intersection. It was inaccessible due to soil/gravel/cobbles and a concrete parking barrier that appears to cover the northern edge of the manhole. This manhole is larger than a usual manhole.

800 AREA

OU9-MH-6 3-16-94. Along 8th Avenue. At P-4/P-6 intersection. Pipelines: P-4, P-6.

Other information: Investigators opened the manhole located at P-4/P-6 intersection. The P-4 pipeline enters on the west side to connect with P-6 that runs north to south. The pipelines are approximately 4 feet from ground surface. All pipes have a closed top with no secondary containment. The P-4/P-6 connection was visible.

OU9-LH-1 3-16-94. Along 8th Avenue, Southwest of Building 883. Pipelines: P-6.

Other information: Investigators opened the lamphole located southwest of Building 883. A vitrified open-top clay pipe approximately 10 to 12 inches with a 4-inch steel pipe inside was visible. The shaft of the manhole runs straight down approximately 4 feet to the pipe. No water is in the manhole.

OU9-LH-2 3-16-94. Along 8th Avenue midway of Building 883. Pipelines: P-6.

Other information: There is a broken piece of a manhole cover on top of a (approximately) 4-inch steel pipe. The pipe is closed top. There is no water in the manhole. The shaft is about 12 inches in diameter and runs straight down approximately 4 to 5 feet.

OU9-MH-7 3-16-94. Along 8th Avenue. At P-6/P-10 intersection. Pipelines: P-6.

Other Information: Investigators opened the manhole located at P-6/P-10 pipeline intersection. The pipelines are approximately 5 to

6 feet from ground surface. All pipes are closed top with no secondary containment. The P-6/P-10 connection is visible.

OU9-LH-3 3-16-94. Along 8th Avenue. At P-6/P-9 intersection. Pipelines: P-6, P-10.

Other information: Investigators opened the lamphole located north of OU9-MH-7 (P-6/P-10 intersection). There is a vitrified clay pipe with a 4-inch steel pipe inside approximately 10 feet from ground surface. The pipe runs north to south. There is no water in the manhole, but the bottom appears to be moist.

OU9-MH-8 3-16-94. Along 8th Avenue. At P-6/P-9 intersection. Pipelines: P-6, P-9.

Other information: Investigators opened the manhole located at the P-6/P-9 intersection. There is a vitrified open top clay pipe with a steel pipe inside. The pipes are approximately 8 to 10 feet from ground surface. The bottom of the manhole appears to be dry. The P-6/P-9 connection is visible.

OU9-MH-9 3-17-94. North of valve vault 5. Pipelines: P-10.

Other information: The manhole north of valve vault #5 northeast of Building 889 was too large and heavy to open.

OU9-MH-10 3-17-94. North of Buildings 889 in middle of the paved road. Pipelines: P-10.

Other information: Investigators opened the manhole located in the middle of the road north of Building 889. One pipe enters from the east about 6 feet from ground surface and exits the west side about 3 feet from ground surface. This appears to be the line from Building 865 tanks.

700 AREA

OU9-LH-4 3-10-94. Sixty feet south of OU9-MH-11. Pipelines: P-12, P-13.

Other information: Investigators opened the lamphole along P-12/P-13 pipeline. Could not see piping. There was water in the manhole approximately 8 feet from surface.

OU9-MH-11 3-10-94. West of Building 707. At P-12/P-13/P-14/P-15 intersection. Pipelines: P-12, P-13, P-14, P-15.

Other information: Investigators opened the manhole for P-12/P-13/P-14/P-15. Cutoffs for two 2-inch steel pipes were visible in one corner of vault. There is various debris in bottom of a large vault. The depth of the vault is approximately 12 feet and the depth to water on the bottom of the vault is approximately 10 feet.

OU9-MH-12 3-10-94. West of Building 707. At P-15/P-16 intersection. Pipelines: P-15, P-16.

Other Information: Investigators opened manhole for P-15/P-16 Two (approximately) 3-4 inch stainless steel pipes were visible approximately 10 feet down. There was about 2-inches of water on the bottom of the vault. The depth of the vault is approximately 15 feet.

OU9-MH-13 3-10-94. Northwest of Building 707. Pipelines: P-15.

Other information: Investigators opened the manhole along P-15 northwest of Building 707. It was full of water and nothing was visible.

OU9-MH-14 3-17-94. Northeast of Building 707, outside Door 3. Pipelines: P-15, P-19, P-20.

Other Information: Investigators opened the manhole northeast of Building 707 outside Door 3 of Building 778, P-15/P-19/P-20 intersection. It was full of water and nothing was visible.

OU9-MH-15 3-10-94. Southeast of Building 559. Pipelines: P-17.

Other information: Investigators opened the manhole for P-17. A 4-inch PVC pipe running north to south with a T to the west was visible approximately 7 feet down and there was approximately 1 foot of water at the bottom of the vault. The vault is approximately 10 feet deep.

OU9-VV-1 3-10-94. Southwest of Building 703. Pipelines: P-20, P-21, P-36, P-37.

Other information: Investigators were unable to enter the valve vault but limited visual observation indicated a double contained pipeline from north to south and a pipeline to the east. All pipeline in valve vault was cut at the wall and removed. The valve vault had approximately 4 feet of water.

OU9-MH-16 Two manholes located near the northwest corner of Building 771. Pipelines: P-23. These manholes did not need investigation because P-23 is an active Plenum line for Building 771.

COP 3-17-94. North of T771C. Pipelines: P-24.

Other information: Investigators opened the cleanout port north of T771C. The cleanout port is eight inches in diameter. The shaft of the cleanout port runs straight to water at approximately 10 feet from ground surface. There appears to be an open channel approximately 8-10 inch pipe at the bottom.

OU9-VV-2 3-10-94. Large valve vault north of T-29, between T-29 and Building 774. Pipelines: P-25, P-27, P-28, P-29, P-35, P-43, P-44, P-46.

Other information: Investigators opened the valve vault located between Building 774 and T-29, pipeline intersections of P-25/P-27/P-28/P-29/P-35/P-43/P-44/P-46. The vault is approximately 10 by 20 feet. Two pipes are visible running north to south, three pipes run east to west. Measured 6 cpm (1 minute reading) on top of vault with an alpha meter.

OU9-VV-3 3-10-94. Small valve vault located North of T-29. Pipelines: P-27, P-28, P-29.

Other information: Investigators opened the manhole in valve vault north of T-29, pipelines P-27/P-28/P-29. Vault size is approximately 8-10 feet. There are two pipelines visible. One that connects to the pipe running up the side of T-29 and one that enters from the south and branches into two pipes to the east. The depths to the pipes is approximately 5 feet and there is approximately 12-15 inches of water in the vault.

3-10-94. Investigators opened the manhole north of Building 776. It is a small concrete circle that contains a ground rod for the Building. It is not related to the OPWL.

OU9-MH-17

3-10-94. Between Buildings 776 and 778. Investigators opened the manhole between Buildings 776 and 778. The manhole is a concrete vault approximately 7-feet deep. A 6-inch pipe (cutoff) is approximately 24 inches from the ground surface. This appears to be a drain pipe and not related to the OPWL. The vault appeared to be dry.

OU9-VV-4

3-10-94. Northeast of T-29. Pipelines: P-35, P-46.

Other information: The depth of the vault is approximately 8 feet with approximately 6 inches of water on the bottom. Three pipes were visible running east to west and two pipes to the south. The vault top gave a 6- cpm reading (1 minute) with the alpha meter.

OU9-MH-18

3-10-94. East of T-29. Pipelines: P-35, P-38, P-45, P-46.

Other information: Investigators opened the manhole east of T-29, P-35/P-38/P-45/P-46 intersection. The depth of the manhole is about 8 to 10 feet. There is a green sludge on the bottom. The size of the manhole is approximately 4 by 4. Two (cutoff) pipes approximately 4 inches in diameter were visible on the north, and an open-top vitrified-clay pipe approximately 10 inches in diameter running east to west was visible.

OU9-VV-5 3-10-94. Pipelines: P-36, P-37, P-41, P-42.

The manhole to the valve vault southwest of T-29 is covered with soil. It appears to be a large manhole. This was not opened due to soil disturbance considerations.

OU9-VV-6 3-16-94. West of the Solar Pond 207A. Pipelines: P-36, P-37.

Other information: Investigators viewed the opened valve vault west of Solar Pond 207A. The vault is open with barricades surrounding it. Four pipes are visible. One pipe on the southeast side appears to have been cut and blanked. The other pipe on the southwest side connects to a west to east running pipe that leads to Solar Pond 207A. One other pipe parallels the west to east running pipe.

OU9-MH-19 3-10-94. West of the Solar Ponds. Pipelines: P-38.

Other information: Investigators opened the manhole west of the Solar Ponds. An open-flow channel pipe (about 12 inches in diameter) is visible at approximately 4 feet from ground surface.

OU9-MH-20 3-10-94. East of the Solar Ponds. Pipelines: P-39, P-45, P-46.

Other information: Investigators opened the manhole located east of the Solar Ponds. The pipeline is an open-top vitrified-clay pipe (about 10 inches in diameter) visible at approximately 10 feet from ground surface.

OU9-MH-21 3-10-94. East of Building 990. Pipelines: P-39.

Other information: Investigators opened the manhole located east of Building 990, P-39/P-40 intersection. An open-top clay pipe was visible at approximately 10 feet from ground surface. The P-39/P-40 intersection was not observed in this manhole.

OU9-MH-22 3-10-94. South of Building 995. Pipelines: P-39.

Other information: Investigators observed the manhole south of Building 995. This manhole is the P-39 and Building 995 outfall. Outfall is a concrete weir with approximately 75 to 100 gallons per minute flow rate.

Miscellaneous manholes

3-17-94. Investigators opened the manhole located northwest of Building 887. These are sewer lines and not related to the OPWL.

3-17-94. Investigators opened the manhole located north of Building 881. This is for sewage or Building 883 foundation drains and not related to the OPWL.

Appendix C

High Purity Germanium Survey Results - Integrated Operable Unit

HPGe DETECTOR RESULTS FOR ALL ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE OPERABLE UNITS

OU	IHSS Number	File Name	Detector Array	Detector Height (m)	FOV m	Station	North feet	East feet	K-40 pCi/g	% Error	MDA pCi/g	Ra-226 pCi/g	% Error	MDA pCi/g	Th-232 pCi/g	% Error	MDA pCi/g	U-238 pCi/g	% Error	MDA pCi/g	U-235 pCi/g	% Error	MDA pCi/g	Cs-137 pCi/g	% Error	MDA pCi/g	Am-241 pCi/g	% Error	MDA pCi/g	Pu-239 nCi/g	% Error	MDA nCi/g	Exposure uR/h	% FOV Blocked
1	130	35.chn	1A66F	6.5	44	D03	7E+05	2E+06	12.4	0.4	0.1	1.37	0.5	0.02	1.19	0.6	0.02	1.9	11.2	0.6	0.04	9.0	0.01	0.11	2.9	0.01	0.0		0.0	0.0		0.0	8.0	0
1	130	32chn	1A66F	6.5	44	E03	7E+05	2E+06	14.5	0.4	0.2	1.09	0.6	0.02	1.36	0.6	0.02	1.4	15.3	0.6	0.07	8.0	0.02	0.10	3.4	0.01	0.0		0.0	0.7	29.5	0.6	8.4	0
1	130	36.chn	1A66F	6.5	44	F03	7E+05	2E+06	12.0	0.4	0.1	0.99	0.6	0.02	1.05	0.7	0.02	1.5	13.2	0.6	0.05	9.0	0.01	0.22	1.6	0.01	0.0		0.0	0.0		0.0	7.2	0
1	130	31.chn	1A66F	6.5	44	D04	7E+05	2E+06	9.2	0.5	0.1	1.01	0.6	0.02	0.96	0.7	0.02	1.6	11.6	0.6	0.06	8.0	0.01	0.18	1.8	0.01	0.2	23.4	0.1	0.0		0.0	6.3	0
1	130	30.chn	1A66F	6.5	44	E04	7E+05	2E+06	12.7	0.4	0.2	1.20	0.6	0.02	1.26	0.6	0.02	1.5	13.5	0.6	0.05	8.0	0.01	0.08	3.8	0.01	0.4	10.9	0.1	0.0		0.0	8.2	0
1	130	39.chn	1A66F	6.5	44	F04	7E+05	2E+06	11.7	0.4	0.1	0.85	0.7	0.02	1.16	0.6	0.02	1.6	12.7	0.6	0.08	8.0	0.02	0.33	1.2	0.01	0.1	31.8	0.1	0.0		0.0	7.0	0
1	130	42.chn	1A66F	6.5	44	D05	7E+05	2E+06	8.0	0.5	0.1	0.87	0.7	0.02	0.89	0.7	0.02	1.8	7.3	0.4	0.06	8.0	0.01	0.19	1.7	0.01	0.2	20.6	0.1	0.0		0.0	5.7	0
1	119.1	14.chn	1A66F	6.5	44	E05	7E+05	2E+06	10.9	0.5	0.2	0.69	0.9	0.02	1.03	0.7	0.02	1.7	11.4	0.6	0.06	10.0	0.02	0.16	2.1	0.01	0.3	12.9	0.1	0.0		0.0	8.2	0
1	119.1	8.chn	1A66F	6.5	44	F05	7E+05	2E+06	11.1	0.4	0.1	0.70	0.8	0.02	1.10	0.6	0.02	1.7	11.3	0.6	0.07	8.0	0.02	0.32	1.2	0.01	0.0		0.0	0.0		0.0	6.6	0
1	119.1	43.chn	1A66F	6.5	44	D06	7E+05	2E+06	10.3	0.5	0.2	0.93	0.7	0.02	1.00	0.7	0.02	1.5	12.4	0.6	0.08	7.0	0.02	0.30	1.3	0.01	0.0		0.0	0.0		0.0	6.6	0
1	119.1	10.chn	1A66F	6.5	44	E06	7E+05	2E+06	11.2	0.4	0.1	0.92	0.7	0.02	1.29	0.6	0.02	3.5	5.9	0.6	0.11	6.0	0.02	0.17	2.0	0.01	0.0		0.0	0.0		0.0	7.5	0
1	119.1	9.chn	1A66F	6.5	44	F06	7E+05	2E+06	13.4	0.4	0.2	0.84	0.7	0.02	1.31	0.6	0.02	2.0	10.4	0.6	0.10	7.0	0.02	0.18	2.0	0.01	0.2	17.2	0.1	0.0		0.0	7.8	0
1	119.1	47.chn	1A66F	6.5	44	D07	7E+05	2E+06	11.0	0.4	0.1	1.07	0.6	0.02	1.08	0.6	0.02	1.8	11.0	0.6	0.08	7.0	0.02	0.28	1.3	0.01	0.1	32.1	0.1	0.0		0.0	7.0	0
1	119.1	11.chn	1A66F	6.5	44	E07	7E+05	2E+06	12.6	0.4	0.2	0.84	0.7	0.02	1.45	0.5	0.02	2.1	9.7	0.6	0.11	6.0	0.02	0.22	1.7	0.01	0.1	33.0	0.1	0.0		0.0	9.9	0
1	119.1	17.chn	1A66F	6.5	44	D08	7E+05	2E+06	10.8	0.5	0.2	0.78	0.8	0.02	0.96	1.2	0.03	1.2	15.5	0.6	0.08	8.0	0.02	0.34	1.2	0.01	0.2	17.1	0.1	0.0		0.0	6.3	0
1	119.1	15.chn	1A66F	6.5	44	E08	7E+05	2E+06	13.4	0.4	0.2	0.94	0.7	0.02	1.51	0.5	0.02	2.0	10.3	0.6	0.10	7.0	0.02	0.26	1.5	0.01	0.0	19.2	0.0	0.0		0.0	8.3	0
1	119.2	44.chn	1A66F	6.5	44	D09	7E+05	2E+06	12.5	0.4	0.2	0.98	0.7	0.02	1.28	0.6	0.02	1.6	12.7	0.6	0.09	7.0	0.02	0.43	1.0	0.01	0.5	8.9	0.1	0.0		0.0	7.8	0
1	119.1	48.chn	1A66F	6.5	44	E09	7E+05	2E+06	12.8	0.4	0.2	1.10	0.6	0.02	1.28	0.6	0.02	1.8	11.3	0.6	0.06	8.0	0.01	0.30	1.3	0.01	0.3	16.9	0.1	0.0		0.0	8.0	0
1	119.2	21.chn	1A66F	6.5	44	D10	7E+05	2E+06	11.1	0.4	0.1	0.78	0.8	0.02	1.16	0.6	0.02	1.4	13.4	0.6	0.06	9.0	0.02	0.35	1.1	0.01	0.5	8.6	0.1	0.0		0.0	6.7	0
1	119.2	22.chn	1A66F	6.5	44	C11	7E+05	2E+06	17.3	0.4	0.2	0.75	0.8	0.02	0.92	0.7	0.02	1.5	13.8	0.6	0.05	11.0	0.02	0.10	3.3	0.01	0.0		0.0	0.0		0.0	10.1	0
1	119.2	24.chn	1A66F	6.5	44	D11	7E+05	2E+06	16.0	0.4	0.2	0.96	0.7	0.02	1.28	0.6	0.02	1.5	14.2	0.6	0.08	8.0	0.02	0.35	1.2	0.01	0.3	14.2	0.1	0.0		0.0	12.6	0
1	119.2	23.chn	1A66F	6.5	44	C12	7E+05	2E+06	14.6	0.4	0.2	0.79	0.8	0.02	1.09	0.7	0.02	1.3	15.5	0.6	0.07	9.0	0.02	0.22	1.7	0.01	0.7	6.7	0.1	0.0		0.0	10.7	0
1	119.1	201.chn	6A6	0.8493	11	10A	7E+05	2E+06	11.5	0.4	0.1	0.81	0.6	0.01	1.18	0.4	0.01	1.7	8.6	0.4	0.10	3.9	0.01	0.17	1.7	0.01	47.6	0.1	0.1	0.0			7.9	0
1	119.1	202.chn	6A6	0.7223	11	10B	7E+05	2E+06	12.0	0.4	0.1	0.84	0.6	0.02	1.26	0.4	0.02	9.7	1.7	0.5	0.83	0.8	0.02	0.13	2.1	0.01	0.1	48.0	0.1	0.0			7.9	0
1	119.1	203.chn	6A6	0.925	11	10C	7E+05	2E+06	13.2	0.3	0.1	0.86	0.6	0.02	1.36	0.4	0.02	3.0	3.7	0.3	0.44	1.4	0.02	0.12	2.3	0.01	0.2	11.8	0.1	0.0			8.2	0
1	119.2	206.chn	6A6	0.937	11	10D	7E+05	2E+06	13.2	0.3	0.1	0.76	0.6	0.01	1.00	0.5	0.01	1.3	11.5	0.4	0.04	6.3	0.01	0.40	0.8	0.01	2.2	1.3	0.1	0.0			6.9	0
2	153	120.chn	4A6	6.5	44	1	7E+05	2E+06	9.9	0.4	0.1	0.66	0.7	0.01	0.95	0.6	0.02	3.9	3.2	0.4	0.10	6.0	0.02	0.15	1.9	0.01	0.7	5.4	0.1	0.0		0.0	5.8	0
2	113	122.chn	4A6	6.5	44	3	7E+05	2E+06	9.0	0.5	0.1	0.58	0.8	0.01	0.81	0.7	0.02	5.0	2.5	0.4	0.14	5.0	0.02	0.17	1.6	0.01	1.4	2.6	0.1	0.0		0.0	5.3	0
2	113	121.chn	4A6	6.5	44	2	7E+05	2E+06	9.5	0.4	0.1	0.66	0.7	0.01	0.82	0.7	0.02	1.7	6.7	0.3	0.06	8.0	0.01	0.18	1.6	0.01	0.4	8.1	0.1	0.0		0.0	5.6	0
2		267.chn	45	7.5	53	K-2	7E+05	2E+06	13.9	3.4	1.4	1.13	4.9	0.17	1.74	3.7	0.19	0.0		4.1	0.00		0.00	0.41	9.0	0.11	8.5	4.4	1.1	0.0		0.0	8.9	0
2		292.chn	45	7.5	53	L-2	7E+05	2E+06	12.9	3.5	1.4	1.11	4.9	0.16	1.73	3.7	0.19	0.0		4.1	0.21	27.1	0.17	0.52	7.4	0.12	3.0	11.7	1.0	0.0		0.0	9.1	0
2		293.chn	45	7.5	53	M-2	7E+05	2E+06	14.4	3.3	1.4	1.07	5.0	0.16	1.44	4.1	0.18	0.0		4.1	0.26	23.3	0.18	0.33	10.2	0.10	1.7	18.6	1.0	0.0		0.0	8.4	0
2	108	123.chn	4A6	6.5	44	4	7E+05	2E+06	11.3	0.4	0.1	0.60	0.8	0.01	0.90	0.6	0.02	1.6	7.7	0.4	0.07	8.0	0.02	0.11	2.4	0.01	5.3	0.8	0.1	0.0		0.0	6.0	0
2		227.chn	45	7.5	53	I-1	7E+05	2E+06	13.4	3.4	1.4	1.13	4.9	0.17	1.67	3.8	0.19	0.0		0.0	0.21	27.8	0.18	0.56	7.2	0.12	30.2	1.6	1.4	0.0		0.0	9.1	0
2		257.chn	45	7.5	53	J-1	7E+05	2E+06	11.4	3.6	1.2	1.20	4.5	0.16	1.52	3.8	0.17	0.0		0.0	0.00		0.00	0.54	6.9	0.11	24.9	1.8	1.3	0.0		0.0	8.4	0
2		258.chn	45	7.5	53	K-1	7E+05	2E+06	11.7	3.7	1.3	1.16	4.8	0.17	1.63	3.7	0.18	0.0		0.0	0.00		0.00	0.62	6.5	0.12	15.0	2.7	1.2	0.0		0.0	8.8	0
2		298.chn	45	7.5	53	L-1	7E+05	2E+06	10.6	3.9	1.2	1.01	5.1	0.15	1.56	3.8	0.18	0.0		0.0	0.00		0.00	0.51	7.4	0.11	4.3	8.0	1.0	0.0		0.0	8.2	0
2		299.chn	45	7.5	53	M-1	7E+05	2E+06	10.8	3.8	1.2	1.31	4.2	0.17	1.70	3.6	0.18	0.0		0.0	0.00		0.00	0.47	8.2	0.11	2.0	16.6	1.0	0.0		0.0	9.3	0
2		124.chn	4A6	6.5	44	5	7E+05	2E+06	20.2	0.3	0.2	0.75	0.8	0.02	1.20	0.6	0.02	2.1	7.1	0.4	0.06	9.0	0.02	0.05	6.2	0.01	1.4	2.9	0.1	0.0		0.0	8.9	0
2		90.chn	45	7.5	53	A1	7E+05	2E+06	13.1	3.4	1.3	0.82	6.1	0.15	1.18	4.6	0.16	0.0		4.1	0.00		0.00	0.28	11.4	0.10	0.9	32.3	0.9	0.0		0.0	7.2	0
2		82.chn	45	7.5	53	B1	7E+05	2E+06	15.9	3.1	1.5	0.92	5.6	0.15	1.14	4.7	0.16	0.0		4.1	0.00		0.00	0.15	18.3	0.08	1.0	28.2	0.9	0.0		0.0	7.9	0
2		100.chn	45	7.5	53	C1	7E+05	2E+06	18.5	2.9	1.6	1.06	5.1	0.16	1.39	4.2	0.18	0.0		4.1	0.00		0.00	0.08	32.5	0.08	0.0		0.0	0.0		0.0	8.1	0
2		101.chn	45	7.5	53	C1	7E+05	2E+06	23.7	3.4	2.4	1.30	6.8	0.27	1.63	5.6	0.27	0.0		4.1	0.00		0.00	0.00		0.10	0.0		0.0	0.0		0.0	8.1	0
2		109.chn	45	7.5	53	D1	7E+05	2E+06	22.9	2.6	1.8	1.08	5.2	0.17	1.66	3.8	0.19	0.0		4.1	0.00		0.00	0.00		0.10	0.0		0.0	0.0		0.0	10.3	0
2		113.chn	45	7.5	53	E1	7E+05	2E+06	21.5	2.7	1.7	1.15	5.1	0.18	1.53	4.1	0.19	0.0		4.1	0.00		0.00	0.00		0.10	0.0		0.0	0.0		0.0	10.1	0
2		178.chn	45	7.5	53	F1	7E+05	2E+06	14.6	3.3	1.4	1.20	4.5	0.16	1.20	4.7	0.17	0.0		4.1	0.14	33.0	0.13	0.24	13.0	0.09	17.1	2.4	1.2	0.0		0.0	8.0	0
2		179.chn	45	7.5	19.4	F1	7E+05	2E+06	14.1	4.4	1.9	1.35	5.6	0.23	1.24	6.3	0.23	0.0		4.1	0.00		0.00	0.41	12.2	0.15	20.6	2.5	1.5	0.0		0.0	8.0	0
2		183.chn	45	7.5	53	G1	7E+05	2E+06	7.7	4.5	1.0	0.77	5.7	0.13	1.01	4.9	0.15	0.0		4.1	0.16	31.5	0.15	0.54	6.7	0.11	84.7	0.8	2.0	0.0		0.0	6.1	0
2		213.chn	45	7.5	19.4	G1	7E+05	2E+06	6.4	6.7	1.3	0.73	8.0	0.18	1.02	6.6	0.20	0.0		4.1	0.00		0.00	0.58	8.4	0.15	105.0	0.9	2.8	0.0		0.0	6.1	0

OU	IHSS Number	File Name	Detector Array	Detector Height (m)	FOV m	Station	North feet	East feet	K-40 pCi/g	% Error	MDA pCi/g	Ra-226 pCi/g	% Error	MDA pCi/g	Th-232 pCi/g	% Error	MDA pCi/g	U-238 pCi/g	% Error	MDA pCi/g	U-235 pCi/g	% Error	MDA pCi/g	Cs-137 pCi/g	% Error	MDA pCi/g	Am-241 pCi/g	% Error	MDA pCi/g	Pu-239 nCi/g	% Error	MDA nCi/g	Exposure uR/h	% FOV Blocked
2		320.chn	45	7.5	53	G1	7E+05	2E+06	8.1	1.3	0.3	0.82	1.7	0.04	1.00	1.5	0.04	2.1	15.5	1.0	0.07	15.7	0.03	0.56	1.9	0.03	78.4	0.2	0.5	0.0		0.0	6.9	0
2		211.chn	45	7.5	53	H1	7E+05	2E+06	12.8	3.5	1.3	1.04	5.0	0.16	1.42	4.0	0.17	5.1	28.5	4.3	0.00		0.00	0.49	7.7	0.11	40.1	1.3	1.6	0.0		0.0	7.7	0
2		212.chn	45	7.5	19.4	H1	7E+05	2E+06	12.2	4.7	1.7	0.88	7.8	0.21	1.30	6.1	0.24	0.0		4.1	0.00		0.00	0.47	11.0	0.15	36.4	1.8	2.0	0.0		0.0	7.7	0
2		215.chn	45	7.5	53	I1	7E+05	2E+06	12.2	3.6	1.3	0.96	5.5	0.16	1.69	3.5	0.18	0.0		4.1	0.00		0.00	0.60	6.5	0.12	26.1	1.8	1.4	0.0		0.0	8.7	0
2		214.chn	45	7.5	19.4	I1	7E+05	2E+06	11.2	4.9	1.6	0.89	8.2	0.22	1.67	5.2	0.26	0.0		4.1	0.00		0.00	0.52	10.5	0.16	22.3	2.5	1.7	0.0		0.0	8.7	0
2		256.chn	45	7.5	53	J1	7E+05	2E+06	12.4	3.6	1.3	1.30	4.4	0.17	1.76	3.6	0.19	0.0		4.1	0.00		0.00	0.60	6.8	0.12	18.7	2.3	1.3	0.0		0.0	9.0	0
2		259.chn	45	7.5	53	K1	7E+05	2E+06	10.5	3.9	1.2	1.08	4.9	0.16	1.65	3.6	0.18	0.0		4.1	0.00		0.00	0.56	6.6	0.11	11.7	3.3	1.2	0.0		0.0	8.1	0
2		297.chn	45	7.5	53	L1	7E+05	2E+06	13.6	3.4	1.4	1.23	4.7	0.17	2.19	3.1	0.20	0.0		4.1	0.00		0.00	0.54	7.7	0.13	5.5	6.8	1.1	0.0		0.0	10.9	0
2		300.chn	45	7.5	53	M1	7E+05	2E+06	13.4	3.4	1.4	1.63	3.8	0.19	2.11	3.3	0.21	0.0		4.1	0.21	25.5	0.16	0.47	8.0	0.11	3.0	11.8	1.1	0.0		0.0	10.9	0
2		91.chn	45	7.5	53	A2	7E+05	2E+06	9.4	4.1	1.2	0.94	5.1	0.14	1.20	4.5	0.16	0.0		4.1	0.00		0.00	0.50	7.0	0.10	1.4	21.5	0.9	0.0		0.0	6.3	0
2		83.chn	45	7.5	53	B2	7E+05	2E+06	9.9	4.0	1.2	0.71	6.4	0.14	1.04	4.7	0.15	0.0		4.1	0.00		0.00	0.53	6.9	0.11	2.9	10.5	0.9	0.0		0.0	5.9	0
2		102.chn	45	7.5	53	C2	7E+05	2E+06	12.0	3.6	1.3	0.82	5.9	0.15	1.10	4.7	0.16	0.0		4.1	0.00		0.00	0.25	11.8	0.09	1.4	20.8	0.9	0.0		0.0	6.3	0
2		110.chn	45	7.5	53	D2	7E+05	2E+06	14.4	3.2	1.4	1.03	4.9	0.15	1.11	4.7	0.16	0.0		4.1	0.00		0.00	0.41	8.4	0.10	7.4	4.6	1.0	0.0		0.0	7.2	0
2		114.chn	45	7.5	53	E2	7E+05	2E+06	19.8	2.8	1.7	1.15	4.9	0.17	1.36	4.3	0.18	0.0		4.1	0.00		0.00	0.17	18.2	0.10	2.0	16.2	1.0	0.0		0.0	9.1	0
2		177.chn	45	7.5	53	F2	7E+05	2E+06	10.8	3.7	1.2	0.99	5.0	0.15	1.25	4.3	0.16	0.0		4.1	0.00		0.00	0.51	7.0	0.11	33.2	1.4	1.4	0.0		0.0	7.3	0
2		182.chn	45	7.5	53	G2	7E+05	2E+06	10.8	3.8	1.2	0.80	5.8	0.14	1.25	4.3	0.16	0.0		4.1	0.00		0.00	0.40	8.1	0.10	28.3	1.6	1.4	0.0		0.0	6.7	0
2		210.chn	45	7.5	53	H2	7E+05	2E+06	13.8	3.3	1.4	1.05	5.1	0.16	1.52	3.9	0.18	0.0		4.1	0.00		0.00	0.52	7.4	0.12	28.7	1.6	1.4	0.0		0.0	8.9	0
2		218.chn	45	7.5	53	I2	7E+05	2E+06	11.6	3.7	1.3	1.11	4.8	0.16	1.37	4.3	0.18	0.0		4.1	0.00		0.00	0.54	7.2	0.12	15.9	2.6	1.2	0.0		0.0	7.2	0
2		228.chn	45	7.5	53	I2	7E+05	2E+06	12.0	3.6	1.3	1.23	4.4	0.16	1.46	4.0	0.18	6.2	23.7	4.4	0.00		0.00	0.59	6.6	0.12	16.2	2.6	1.3	0.0		0.0	8.6	0
2		255.chn	45	7.5	53	J2	7E+05	2E+06	12.0	3.6	1.3	1.19	4.6	0.16	1.47	4.1	0.18	0.0		4.1	0.00		0.00	0.61	6.7	0.12	16.7	2.5	1.3	0.0		0.0	8.7	0
2		260.chn	45	7.5	53	K2	7E+05	2E+06	11.0	3.8	1.3	1.09	4.8	0.16	1.45	4.1	0.18	0.0		4.1	0.00		0.00	0.57	6.8	0.12	12.0	3.2	1.2	0.0		0.0	8.1	0
2		296.chn	45	7.5	53	L2	7E+05	2E+06	9.9	4.0	1.2	0.87	5.7	0.15	1.38	4.0	0.17	0.0		4.1	0.00		0.00	0.52	6.7	0.11	4.6	7.5	1.0	0.0		0.0	6.8	0
2		301.chn	45	7.5	53	M2	7E+05	2E+06	10.5	3.9	1.2	1.36	4.1	0.17	1.36	4.1	0.17	0.0		4.1	0.00		0.00	0.45	8.0	0.11	3.1	10.9	1.0	0.0		0.0	8.2	0
2		92.chn	45	7.5	53	A3	7E+05	2E+06	9.2	4.2	1.2	0.86	5.5	0.14	1.19	4.4	0.16	0.0		4.1	0.23	22.8	0.16	0.55	6.4	0.11	1.9	15.8	0.9	0.0		0.0	6.0	0
2		84.chn	45	7.5	53	B3	7E+05	2E+06	8.3	4.4	1.1	0.68	6.4	0.13	1.01	4.7	0.14	0.0		4.1	0.00		0.00	0.35	8.9	0.09	2.9	10.1	0.9	0.0		0.0	5.0	0
2		103.chn	45	7.5	53	C3	7E+05	2E+06	10.8	3.8	1.2	0.83	5.6	0.14	1.03	4.9	0.15	0.0		4.1	0.00		0.00	0.39	8.2	0.10	2.7	11.3	0.9	0.0		0.0	6.0	0
2		111.chn	45	7.5	53	D3	7E+05	2E+06	9.7	4.0	1.2	0.99	4.9	0.15	1.07	4.8	0.15	0.0		4.1	0.00		0.00	0.63	6.0	0.11	14.3	2.7	1.2	0.0		0.0	6.3	0
2		115.chn	45	7.5	53	E3	7E+05	2E+06	14.8	3.2	1.4	0.97	5.2	0.15	1.20	4.4	0.16	0.0		4.1	0.17	28.3	0.15	0.31	10.3	0.10	10.5	3.5	1.1	0.0		0.0	7.5	0
2		176.chn	45	7.5	53	F3	7E+05	2E+06	8.8	4.2	1.1	1.01	4.8	0.15	1.20	4.3	0.15	0.0		4.1	0.00		0.00	0.60	6.2	0.11	19.9	2.0	1.2	0.0		0.0	6.2	0
2		184.chn	45	7.5	53	G3	7E+05	2E+06	17.1	3.0	1.5	1.31	4.6	0.18	2.05	3.3	0.20	0.0		4.1	0.00		0.00	0.25	13.8	0.10	8.5	4.4	1.1	0.0		0.0	10.8	0
2		209.chn	45	7.5	53	H3	7E+05	2E+06	13.1	3.4	1.3	1.10	4.8	0.16	1.41	4.1	0.17	0.0		4.1	0.00		0.00	0.41	8.7	0.11	14.2	2.8	1.2	0.0		0.0	7.7	0
2		219.chn	45	7.5	53	I3	7E+05	2E+06	13.8	3.4	1.4	1.25	4.5	0.17	1.63	3.8	0.19	0.0		4.1	0.00		0.00	0.57	7.1	0.12	14.0	2.9	1.2	0.0		0.0	8.8	0
2		229.chn	45	7.5	53	I3	7E+05	2E+06	12.8	3.5	1.3	1.24	4.5	0.17	1.64	3.8	0.19	0.0		4.1	0.00		0.00	0.60	6.6	0.12	13.5	3.0	1.2	0.0		0.0	8.3	0
2		254.chn	45	7.5	53	J3	7E+05	2E+06	11.0	3.8	1.3	1.15	4.7	0.16	1.43	4.0	0.17	0.0		4.1	0.00		0.00	0.68	6.0	0.12	12.1	3.2	1.2	0.0		0.0	7.8	0
2		261.chn	45	7.5	53	K3	7E+05	2E+06	11.4	3.8	1.3	1.26	4.5	0.17	1.78	3.5	0.19	0.0		4.1	0.00		0.00	0.57	6.9	0.12	9.0	4.2	1.1	0.0		0.0	8.9	0
2		287.chn	45	7.5	53	L3	7E+05	2E+06	12.0	3.6	1.3	1.23	4.6	0.17	1.71	3.6	0.18	0.0		4.1	0.20	27.8	0.16	0.54	7.2	0.12	5.4	6.7	1.1	0.0		0.0	8.6	0
2		302.chn	45	7.5	53	M3	7E+05	2E+06	11.6	3.7	1.3	1.43	4.1	0.18	1.48	4.0	0.18	0.0		4.1	0.18	27.2	0.15	0.47	7.7	0.11	2.9	11.7	1.0	0.0		0.0	8.2	0
2		93.chn	45	7.5	53	A4	7E+05	2E+06	7.6	4.5	1.0	0.89	5.0	0.13	1.09	4.6	0.15	0.0		4.1	0.00		0.00	0.65	5.8	0.11	2.2	13.5	0.9	0.0		0.0	5.6	0
2		85.chn	45	7.5	53	B4	7E+05	2E+06	8.4	4.3	1.1	0.75	5.8	0.13	0.97	4.9	0.14	0.0		4.1	0.00		0.00	0.54	6.3	0.10	2.4	12.2	0.9	0.0		0.0	4.8	0
2		104.chn	45	7.5	53	C4	7E+05	2E+06	12.8	3.5	1.3	0.85	5.5	0.14	1.02	5.1	0.16	4.2	27.5	3.5	0.00		0.00	0.35	9.0	0.09	1.7	17.2	0.9	0.0		0.0	6.3	0
2		112.chn	45	7.5	53	D4	7E+05	2E+06	12.9	3.5	1.4	1.24	4.3	0.16	1.20	4.5	0.16	0.0		4.1	0.00		0.00	0.37	8.9	0.10	5.1	6.4	1.0	0.0		0.0	7.6	0
2		152.chn	45	7.5	53	E4	7E+05	2E+06	9.3	4.1	1.1	0.94	5.0	0.14	1.09	4.6	0.15	0.0		4.1	0.00		0.00	0.64	5.9	0.11	20.4	2.0	1.2	0.0		0.0	5.9	0
2		175.chn	45	7.5	53	F4	7E+05	2E+06	10.0	3.9	1.2	1.04	4.7	0.15	1.24	4.2	0.16	0.0		4.1	0.21	23.4	0.15	0.53	6.7	0.11	19.7	2.1	1.2	0.0		0.0	6.6	0
2		185.chn	45	7.5	53	G4	7E+05	2E+06	12.1	3.6	1.3	0.99	5.2	0.15	1.42	4.0	0.17	0.0		4.1	0.00		0.00	0.65	6.2	0.12	35.4	1.4	1.5	0.0		0.0	7.9	0
2		208.chn	45	7.5	53	H4	7E+05	2E+06	16.8	3.0	1.5	1.13	4.9	0.17	1.69	3.8	0.19	0.0		4.1	0.00		0.00	0.30	11.2	0.10	7.9	4.6	1.1	0.0		0.0	9.2	0
2		220.chn	45	7.5	53	I4	7E+05	2E+06	17.7	3.0	1.6	1.32	4.5	0.18	1.55	4.1	0.19	0.0		4.1	0.00		0.00	0.23	14.0	0.10	2.1	15.8	1.0	0.0		0.0	9.3	0
2		230.chn	45	7.5	53	I4	7E+05	2E+06	18.9	2.8	1.6	1.55	4.0	0.19	1.57	4.0	0.19	5.0	30.4	4.5	0.00		0.00	0.25	13.4	0.10	2.0	16.5	1.0	0.0		0.0	9.9	0
2		253.chn	45	7.5	53	J4	7E+05	2E+06	13.3	3.4	1.4	1.17	4.8	0.17	1.76	3.6	0.19	0.0		4.1	0.00		0.00	0.62	6.7	0.13	8.3	4.5	1.1	0.0		0.0	9.2	0
2		262.chn	45	7.5	53	K4	7E+05	2E+06	11.9	3.6	1.3	1.03	5.1	0.16	1.75	3.5	0.18	0.0		4.1	0.00		0.00	0.52	7.5	0.12	6.2	5.8	1.1	0.0		0.0	8.2	0

OU	IHSS Number	File Name	Detector Array	Detector Height (m)	FOV m	Station	North feet	East feet	K-40 pCi/g	% Error	MDA pCi/g	Ra-226 pCi/g	% Error	MDA pCi/g	Th-232 pCi/g	% Error	MDA pCi/g	U-238 pCi/g	% Error	MDA pCi/g	U-235 pCi/g	% Error	MDA pCi/g	Cs-137 pCi/g	% Error	MDA pCi/g	Am-241 pCi/g	% Error	MDA pCi/g	Pu-239 nCi/g	% Error	MDA nCi/g	Exposure uR/h	% FOV Blocked
2		286.chn	45	7.5	53	L4	7E+05	2E+06	11.3	3.8	1.3	1.13	4.8	0.16	1.65	3.8	0.19	0.0		4.1	0.00		0.00	0.53	7.3	0.12	5.1	6.9	1.0	0.0		0.0	8.5	0
2		303.chn	45	7.5	53	M4	7E+05	2E+06	12.7	3.5	1.3	1.62	3.8	0.18	1.67	3.8	0.19	0.0		4.1	0.00		0.00	0.38	9.7	0.11	2.6	13.2	1.0	0.0		0.0	9.4	0
2		94.chn	45	7.5	53	A5	7E+05	2E+06	7.2	4.8	1.0	0.86	5.3	0.14	1.03	4.8	0.15	0.0		4.1	0.00		0.00	0.67	5.7	0.11	2.2	13.4	0.9	0.0		0.0	5.4	0
2		88.chn	45	7.5	53	B5	7E+05	2E+06	8.9	4.1	1.1	0.69	6.2	0.13	1.01	4.7	0.14	0.0		4.1	0.00		0.00	0.37	8.8	0.10	1.2	22.9	0.9	0.0		0.0	5.4	0
2		107.chn	45	7.5	53	C5	7E+05	2E+06	15.6	3.1	1.5	0.91	5.4	0.15	1.24	4.3	0.16	0.0		4.1	0.00		0.00	0.23	12.2	0.08	1.5	19.1	0.9	0.0		0.0	7.1	0
2		116.chn	45	7.5	53	D5	7E+05	2E+06	11.7	3.6	1.3	0.87	5.3	0.14	1.01	5.0	0.15	0.0		4.1	0.00		0.00	0.34	9.3	0.09	5.9	5.4	1.0	0.0		0.0	6.0	0
2		153.chn	45	7.5	53	E5	7E+05	2E+06	8.3	4.4	1.1	1.02	4.7	0.14	1.15	4.4	0.15	4.5	28.2	3.8	0.00		0.00	0.65	5.8	0.11	18.5	2.1	1.2	0.0		0.0	6.2	0
2		174.chn	45	7.5	53	F5	7E+05	2E+06	9.4	4.1	1.2	0.99	4.9	0.15	1.22	4.4	0.16	0.0		4.1	0.00		0.00	0.61	6.2	0.11	19.7	2.1	1.2	0.0		0.0	6.4	0
2		186.chn	45	7.5	53	G5	7E+05	2E+06	10.3	3.8	1.2	0.93	5.4	0.15	1.34	4.2	0.17	0.0		4.1	0.00		0.00	0.47	7.4	0.10	18.1	2.2	1.2	0.0		0.0	7.0	0
2		207.chn	45	7.5	53	H5	7E+05	2E+06	17.2	3.0	1.5	1.20	4.7	0.17	1.69	3.8	0.19	0.0		4.1	0.18	30.2	0.16	0.28	12.0	0.10	4.1	8.3	1.0	0.0		0.0	9.8	0
2		221.chn	45	7.5	53	I5	7E+05	2E+06	14.7	3.3	1.5	1.28	4.5	0.17	1.57	4.0	0.19	0.0		4.1	0.18	29.9	0.16	0.47	8.3	0.12	6.1	6.0	1.1	0.0		0.0	8.5	0
2		231.chn	45	7.5	53	I5	7E+05	2E+06	14.9	3.3	1.5	1.46	4.1	0.18	1.65	3.8	0.19	0.0		4.1	0.25	22.8	0.17	0.49	7.8	0.11	6.0	6.0	1.1	0.0		0.0	9.8	0
2		252.chn	45	7.5	53	J5	7E+05	2E+06	13.8	3.4	1.4	1.27	4.7	0.18	1.84	3.6	0.20	0.0		4.1	0.00		0.00	0.59	6.8	0.12	5.6	6.4	1.1	0.0		0.0	9.6	0
2		263.chn	45	7.5	53	K5	7E+05	2E+06	10.0	4.0	1.2	1.02	4.9	0.15	1.40	4.1	0.17	0.0		4.1	0.00		0.00	0.55	7.0	0.12	5.7	6.0	1.0	0.0		0.0	6.8	0
2		285.chn	45	7.5	53	L5	7E+05	2E+06	11.9	3.6	1.3	1.22	4.6	0.17	1.78	3.5	0.19	0.0		4.1	0.00		0.00	0.62	6.5	0.12	4.7	7.4	1.1	0.0		0.0	9.0	0
2		304.chn	45	7.5	53	M5	7E+05	2E+06	13.3	3.5	1.4	1.60	3.8	0.18	1.93	3.4	0.20	0.0		4.1	0.16	30.2	0.14	0.38	9.8	0.11	2.8	12.2	1.0	0.0		0.0	10.2	0
2		95.chn	45	7.5	53	A6	7E+05	2E+06	9.1	4.1	1.1	0.79	5.7	0.13	1.04	4.8	0.15	0.0		4.1	0.00		0.00	0.54	6.6	0.11	1.6	18.1	0.9	0.0		0.0	5.7	0
2		89.chn	45	7.5	53	B6	7E+05	2E+06	11.2	3.7	1.2	0.85	5.4	0.14	1.04	4.9	0.15	0.0		4.1	0.00		0.00	0.33	9.4	0.09	1.3	21.7	0.8	0.0		0.0	6.3	0
2		108.chn	45	7.5	53	C6	7E+05	2E+06	19.1	2.9	1.7	1.01	5.1	0.15	1.24	4.5	0.17	0.0		4.1	0.00		0.00	0.12	23.4	0.09	0.0		0.0	0.0		0.0	8.5	0
2		151.chn	45	7.5	53	D6	7E+05	2E+06	8.9	4.2	1.1	0.90	5.1	0.14	1.07	4.6	0.15	0.0		4.1	0.20	25.3	0.15	0.67	5.8	0.12	10.4	3.3	1.0	0.0		0.0	5.8	0
2		154.chn	45	7.5	53	E6	7E+05	2E+06	7.4	4.7	1.0	0.99	4.8	0.14	1.08	4.6	0.15	0.0		4.1	0.00		0.00	0.78	5.1	0.12	13.7	2.7	1.1	0.0		0.0	5.9	0
2		171.chn	45	7.5	53	F6	7E+05	2E+06	8.8	4.3	1.1	0.89	5.4	0.14	1.12	4.7	0.16	0.0		4.1	0.00		0.00	0.51	7.3	0.11	10.8	3.4	1.1	0.0		0.0	5.6	0
2		187.chn	45	7.5	53	G6	7E+05	2E+06	11.0	3.8	1.3	0.92	5.2	0.14	1.21	4.3	0.16	0.0		4.1	0.00		0.00	0.62	6.1	0.11	19.3	2.1	1.2	0.0		0.0	6.6	0
2		206.chn	45	7.5	53	H6	7E+05	2E+06	12.6	3.5	1.3	1.22	4.5	0.16	1.43	4.1	0.18	0.0		4.1	0.17	30.4	0.15	0.51	7.2	0.11	10.6	3.5	1.1	0.0		0.0	8.2	0
2		222.chn	45	7.5	53	I6	7E+05	2E+06	12.9	3.5	1.4	1.17	4.8	0.17	1.41	4.1	0.17	0.0		4.1	0.16	31.2	0.15	0.55	7.0	0.12	6.5	5.5	1.1	0.0		0.0	7.9	0
2		232.chn	45	7.5	53	I6	7E+05	2E+06	12.1	3.6	1.3	1.42	4.1	0.17	1.38	4.2	0.17	0.0		4.1	0.00		0.00	0.52	7.4	0.12	6.4	5.5	1.1	0.0		0.0	8.6	0
2		251.chn	45	7.5	53	J6	7E+05	2E+06	13.5	3.4	1.4	1.31	4.4	0.17	1.77	3.6	0.19	1.3	4.4	0.2	0.24	24.2	0.17	0.53	7.3	0.12	4.9	7.1	1.0	0.0		0.0	9.3	0
2		264.chn	45	7.5	53	K6	7E+05	2E+06	11.1	3.7	1.2	1.02	5.1	0.16	1.64	3.7	0.18	0.0		4.1	0.00		0.00	0.49	7.6	0.11	3.9	8.9	1.0	0.0		0.0	8.1	0
2		284.chn	45	7.5	53	L6	7E+05	2E+06	12.1	3.6	1.3	1.10	5.0	0.17	1.73	3.7	0.19	0.0		4.1	0.16	33.0	0.16	0.53	7.4	0.12	3.3	10.3	1.0	0.0		0.0	9.0	0
2		305.chn	45	7.5	53	M6	7E+05	2E+06	12.1	3.6	1.3	1.39	4.2	0.18	1.71	3.6	0.18	0.0		4.1	0.00		0.00	0.32	10.1	0.10	2.0	16.6	1.0	0.0		0.0	9.5	0
2		96.chn	45	7.5	53	A7	7E+05	2E+06	9.1	4.1	1.1	0.84	5.4	0.14	1.12	4.5	0.15	0.0		4.1	0.00		0.00	0.65	5.9	0.12	1.7	16.7	0.9	0.0		0.0	6.1	0
2		99.chn	45	7.5	53	B7	7E+05	2E+06	11.2	3.8	1.3	0.83	5.9	0.15	1.07	4.7	0.15	0.0		4.1	0.00		0.00	0.38	8.9	0.10	1.4	20.1	0.9	0.0		0.0	6.4	0
2		132.chn	45	7.5	53	C7	7E+05	2E+06	11.2	3.7	1.2	1.22	4.2	0.15	1.00	5.1	0.15	0.0		4.1	0.00		0.00	0.30	10.4	0.09	1.5	19.1	0.9	0.0		0.0	6.1	0
2		150.chn	45	7.5	53	D7	7E+05	2E+06	8.4	4.3	1.1	0.98	4.8	0.14	1.09	4.5	0.15	0.0		4.1	0.00		0.00	0.59	6.3	0.11	6.2	5.3	1.0	0.0		0.0	6.1	0
2		155.chn	45	7.5	53	E7	7E+05	2E+06	8.6	4.2	1.1	0.98	4.7	0.14	1.12	4.6	0.15	0.0		4.1	0.00		0.00	0.64	6.0	0.11	8.4	4.1	1.0	0.0		0.0	6.0	0
2		170.chn	45	7.5	53	F7	7E+05	2E+06	12.1	3.6	1.3	1.01	4.9	0.15	1.35	4.1	0.17	0.0		4.1	0.00		0.00	0.33	10.3	0.10	4.3	7.5	1.0	0.0		0.0	7.1	0
2		188.chn	45	7.5	53	G7	7E+05	2E+06	9.9	3.9	1.2	0.92	5.2	0.14	1.27	4.3	0.16	0.0		4.1	0.00		0.00	0.74	5.3	0.12	18.9	2.1	1.2	0.0		0.0	6.5	0
2		205.chn	45	7.5	53	H7	7E+05	2E+06	11.3	3.8	1.3	1.19	4.5	0.16	1.39	4.1	0.17	0.0		4.1	0.00		0.00	0.67	6.0	0.12	14.2	2.7	1.2	0.0		0.0	7.9	0
2		223.chn	45	7.5	53	I7	7E+05	2E+06	10.6	3.8	1.2	1.03	5.1	0.16	1.27	4.4	0.17	0.0		4.1	0.00		0.00	0.58	7.0	0.12	8.0	4.5	1.1	0.0		0.0	7.0	0
2		233.chn	45	7.5	53	I7	7E+05	2E+06	11.2	3.8	1.3	1.31	4.2	0.17	1.16	4.8	0.17	0.0		4.1	0.00		0.00	0.62	6.4	0.12	7.8	4.6	1.1	0.0		0.0	8.0	0
2		250.chn	45	7.5	53	J7	7E+05	2E+06	11.3	3.7	1.3	1.20	4.5	0.16	1.56	3.8	0.18	0.0		4.1	0.00		0.00	0.59	6.5	0.12	4.6	7.5	1.0	0.0		0.0	8.5	0
2		265.chn	45	7.5	53	K7	7E+05	2E+06	12.7	3.5	1.3	1.14	4.6	0.16	1.72	3.6	0.19	0.0		4.1	0.00		0.00	0.31	10.8	0.10	1.5	20.8	1.0	0.0		0.0	8.6	0
2		283.chn	45	7.5	53	L7	7E+05	2E+06	13.8	3.4	1.4	1.19	4.7	0.17	1.66	3.8	0.19	0.0		4.1	0.00		0.00	0.26	12.3	0.09	1.1	29.0	1.0	0.0		0.0	8.9	0
2		306.chn	45	7.5	53	M7	7E+05	2E+06	13.7	3.4	1.4	1.30	4.4	0.17	1.46	4.2	0.18	0.0		4.1	0.00		0.00	0.18	16.4	0.09	0.0		0.0	0.0		0.0	8.6	0
2		97.chn	45	7.5	53	A8	7E+05	2E+06	8.4	4.4	1.1	0.75	5.9	0.13	0.96	5.0	0.14	0.0		4.1	0.00		0.00	0.48	6.9	0.10	1.1	25.4	0.8	0.0		0.0	5.4	0
2		117.chn	45	7.5	53	B8	7E+05	2E+06	17.8	2.9	1.5	0.86	6.0	0.16	1.31	4.4	0.17	0.0		4.1	0.00		0.00	0.19	15.9	0.09	0.0		0.0	0.0		0.0	8.6	0
2		133.chn	45	7.5	53	C8	7E+05	2E+06	9.0	4.1	1.1	1.18	4.2	0.15	1.08	4.7	0.15	0.0		4.1	0.00		0.00	0.62	6.1	0.11	5.4	6.0	1.0	0.0		0.0	6.3	0
2		149.chn	45	7.5	53	D8	7E+05	2E+06	8.6	4.3	1.1	0.93	5.0	0.14	1.13	4.5	0.15	0.0		4.1	0.00		0.00	0.72	5.5	0.12	10.3	3.3	1.0	0.0		0.0	5.9	0
2		156.chn	45	7.5	53	E8	7E+05	2E+06	10.2	3.9	1.2	0.94	5.1	0.14	1.19	4.3	0.15	0.0		4.1	0.00		0.00	0.54	6.7	0.11	6.3	5.1	1.0	0.0		0.0	6.4	0

OU	IHSS Number	File Name	Detector Array	Detector Height (m)	FOV m	Station	North feet	East feet	K-40 pCi/g	% Error	MDA pCi/g	Ra-226 pCi/g	% Error	MDA pCi/g	Th-232 pCi/g	% Error	MDA pCi/g	U-238 pCi/g	% Error	MDA pCi/g	U-235 pCi/g	% Error	MDA pCi/g	Cs-137 pCi/g	% Error	MDA pCi/g	Am-241 pCi/g	% Error	MDA pCi/g	Pu-239 nCi/g	% Error	MDA nCi/g	Exposure uR/h	% FOV Blocked
2		169.chn	45	7.5	53	F8	7E+05	2E+06	15.0	3.2	1.4	1.11	4.8	0.16	1.65	3.6	0.18	0.0		4.1	0.19	27.6	0.16	0.25	13.0	0.10	1.2	25.4	0.9	0.0		0.0	8.0	0
2		189.chn	45	7.5	53	G8	7E+05	2E+06	13.0	3.4	1.3	0.83	5.8	0.14	1.13	4.7	0.16	0.0		4.1	0.00		0.00	0.17	16.0	0.08	0.9	34.0	0.9	0.0		0.0	7.0	0
2		204.chn	45	7.5	53	H8	7E+05	2E+06	15.1	3.2	1.4	1.07	4.7	0.15	1.27	4.4	0.17	0.0		4.1	0.00		0.00	0.18	15.6	0.08	1.3	23.9	0.9	0.0		0.0	7.6	0
2		224.chn	45	7.5	53	I8	7E+05	2E+06	11.8	3.7	1.3	1.04	5.0	0.16	1.38	4.1	0.17	0.0		4.1	0.00		0.00	0.57	6.6	0.11	5.3	6.5	1.0	0.0		0.0	7.2	0
2		234.chn	45	7.5	53	I8	7E+05	2E+06	12.0	3.6	1.3	1.28	4.2	0.16	1.28	4.5	0.17	0.0		4.1	0.00		0.00	0.50	7.4	0.11	5.5	6.2	1.0	0.0		0.0	7.7	0
2		249.chn	45	7.5	53	J8	7E+05	2E+06	11.3	3.7	1.3	1.05	4.9	0.15	1.33	4.2	0.17	0.0		4.1	0.00		0.00	0.49	7.2	0.11	3.7	8.9	1.0	0.0		0.0	7.1	0
2		266.chn	45	7.5	53	K8	7E+05	2E+06	11.7	3.7	1.3	1.01	5.2	0.16	1.63	3.7	0.18	0.0		4.1	0.00		0.00	0.51	7.3	0.11	2.7	12.2	1.0	0.0		0.0	8.3	0
2		282.chn	45	7.5	53	L8	7E+05	2E+06	13.1	3.5	1.4	1.22	4.6	0.17	1.73	3.6	0.19	0.0		4.1	0.00		0.00	0.49	7.7	0.11	2.5	13.4	1.0	0.0		0.0	9.5	0
2		307.chn	45	7.5	53	M8	7E+05	2E+06	12.0	3.6	1.3	1.19	4.6	0.16	1.36	4.2	0.17	0.0		4.1	0.21	25.0	0.16	0.24	13.1	0.10	0.0		0.0	0.0		0.0	7.4	0
2		98.chn	45	7.5	53	A9	7E+05	2E+06	12.1	3.6	1.3	0.85	5.6	0.14	1.14	4.6	0.16	0.0		4.1	0.00		0.00	0.23	13.2	0.09	0.0		0.0	0.0		0.0	6.2	0
2		131.chn	45	7.5	53	B9	7E+05	2E+06	9.9	3.9	1.2	1.11	4.5	0.15	1.07	4.8	0.15	0.0		4.1	0.00		0.00	0.60	6.3	0.11	2.4	12.7	0.9	0.0		0.0	6.7	0
2		134.chn	45	7.5	53	C9	7E+05	2E+06	8.4	4.3	1.1	1.07	4.5	0.14	1.05	4.7	0.15	0.0		4.1	0.00		0.00	0.66	5.8	0.12	5.0	6.3	0.9	0.0		0.0	6.2	0
2		148.chn	45	7.5	53	D9	7E+05	2E+06	7.6	4.6	1.0	0.87	5.3	0.14	1.13	4.5	0.15	0.0		4.1	0.00		0.00	0.78	5.3	0.12	8.0	4.1	1.0	0.0		0.0	5.8	0
2		157.chn	45	7.5	53	E9	7E+05	2E+06	8.5	4.3	1.1	0.97	5.0	0.15	1.24	4.3	0.16	0.0		4.1	0.00		0.00	0.66	5.8	0.12	6.9	4.8	1.0	0.0		0.0	6.5	0
2		168.chn	45	7.5	53	F9	7E+05	2E+06	17.3	3.0	1.6	1.18	4.7	0.17	1.67	3.8	0.19	0.0		4.1	0.00		0.00	0.23	13.9	0.10	0.0		0.0	0.0		0.0	9.7	0
2		190.chn	45	7.5	53	G9	7E+05	2E+06	14.1	3.3	1.4	0.82	5.7	0.14	1.16	4.7	0.16	0.0		4.1	0.00		0.00	0.00		0.10	0.0		0.0	0.0		0.0	6.9	0
2		203.chn	45	7.5	53	H9	7E+05	2E+06	17.5	2.9	1.5	1.18	4.7	0.17	1.48	4.1	0.18	0.0		4.1	0.00		0.00	0.08	32.0	0.08	0.0		0.0	0.0		0.0	8.2	0
2		235.chn	45	7.5	53	I9	7E+05	2E+06	11.5	3.7	1.3	1.18	4.5	0.16	1.29	4.3	0.17	0.0		4.1	0.00		0.00	0.37	9.2	0.10	3.2	10.2	1.0	0.0		0.0	7.4	0
2		248.chn	45	7.5	53	J9	7E+05	2E+06	10.8	3.8	1.2	0.90	5.6	0.15	1.31	4.1	0.16	0.0		4.1	0.18	29.4	0.16	0.54	7.0	0.11	3.9	8.3	1.0	0.0		0.0	7.0	0
2		270.chn	45	7.5	53	K9	7E+05	2E+06	9.9	4.0	1.2	0.87	5.6	0.15	1.40	4.0	0.17	0.0		4.1	0.00		0.00	0.50	7.2	0.11	2.9	11.0	1.0	0.0		0.0	6.7	0
2		281.chn	45	7.5	53	L9	7E+05	2E+06	12.4	3.6	1.3	1.13	4.8	0.16	1.61	3.7	0.18	6.2	23.6	4.4	0.19	28.4	0.16	0.58	6.7	0.12	2.4	13.7	1.0	0.0		0.0	8.5	0
2		308.chn	45	7.5	53	M9	7E+05	2E+06	11.1	3.8	1.3	1.20	4.4	0.16	1.31	4.3	0.17	0.0		4.1	0.20	25.7	0.15	0.23	13.8	0.09	0.8	42.0	1.0	0.0		0.0	7.7	0
2		118.chn	45	7.5	53	A10	7E+05	2E+06	17.8	2.9	1.5	0.91	5.8	0.16	1.33	4.3	0.17	0.0		4.1	0.00		0.00	0.29	11.1	0.10	1.0	29.7	0.9	0.0		0.0	8.3	0
2		130.chn	45	7.5	53	B10	7E+05	2E+06	7.9	4.5	1.1	1.10	4.5	0.15	1.07	4.6	0.15	0.0		4.1	0.00		0.00	0.82	4.9	0.12	3.7	8.2	0.9	0.0		0.0	6.0	0
2		135.chn	45	7.5	53	C10	7E+05	2E+06	8.3	4.4	1.1	0.84	5.3	0.13	1.11	4.5	0.15	0.0		4.1	0.23	21.7	0.15	0.55	6.8	0.11	3.2	9.2	0.9	0.0		0.0	5.4	0
2		147.chn	45	7.5	53	D10	7E+05	2E+06	7.4	4.6	1.0	0.82	5.5	0.14	1.18	4.3	0.15	0.0		4.1	0.00		0.00	0.76	5.1	0.12	6.1	5.2	1.0	0.0		0.0	6.1	0
2		158.chn	45	7.5	53	E10	7E+05	2E+06	7.9	4.5	1.1	0.91	5.1	0.14	1.02	4.8	0.15	0.0		4.1	0.00		0.00	0.83	5.0	0.12	8.5	4.0	1.0	0.0		0.0	6.1	0
2		165.chn	45	7.5	53	F10	7E+05	2E+06	16.0	3.1	1.5	1.14	4.8	0.16	1.67	3.6	0.18	4.9	29.0	4.3	0.33	18.1	0.18	0.25	13.9	0.10	2.0	15.2	0.9	0.0		0.0	9.2	0
2		191.chn	45	7.5	53	G10	7E+05	2E+06	12.4	3.5	1.3	0.71	6.5	0.14	1.12	4.7	0.16	0.0		4.1	0.00		0.00	0.14	18.0	0.08	0.0		0.0	0.0		0.0	6.0	0
2		202.chn	45	7.5	53	H10	7E+05	2E+06	12.1	3.6	1.3	0.96	5.3	0.15	1.27	4.3	0.16	5.5	25.3	4.2	0.00		0.00	0.25	11.9	0.09	1.3	23.4	0.9	0.0		0.0	7.4	0
2		236.chn	45	7.5	53	I10	7E+05	2E+06	11.4	3.7	1.3	1.17	4.5	0.16	1.26	4.5	0.17	0.0		4.1	0.00		0.00	0.54	7.0	0.11	4.4	7.6	1.0	0.0		0.0	7.4	0
2		247.chn	45	7.5	53	J10	7E+05	2E+06	10.1	3.9	1.2	0.82	5.7	0.14	1.25	4.3	0.16	0.0		4.1	0.00		0.00	0.58	6.3	0.11	3.2	9.9	0.9	0.0		0.0	6.3	0
2		271.chn	45	7.5	53	K10	7E+05	2E+06	8.4	4.3	1.1	0.89	5.2	0.14	1.23	4.2	0.15	0.0		4.1	0.00		0.00	0.51	6.8	0.10	2.9	10.8	0.9	0.0		0.0	5.8	0
2		280.chn	45	7.5	53	L10	7E+05	2E+06	9.4	4.1	1.2	0.98	5.0	0.15	1.32	4.1	0.16	0.0		4.1	0.00		0.00	0.52	6.9	0.11	2.3	13.4	0.9	0.0		0.0	6.8	0
2		309.chn	45	7.5	53	M10	7E+05	2E+06	15.6	3.2	1.5	1.41	4.0	0.17	1.39	4.2	0.18	0.0		4.1	0.18	27.7	0.15	0.16	18.4	0.09	0.0		0.0	0.0		0.0	8.8	0
2		119.chn	45	7.5	53	A11	7E+05	2E+06	11.4	3.7	1.3	0.95	5.1	0.14	1.12	4.7	0.16	0.0		4.1	0.00		0.00	0.45	7.7	0.10	1.0	29.5	0.9	0.0		0.0	6.5	0
2		129.chn	45	7.5	53	B11	7E+05	2E+06	8.2	4.4	1.1	1.09	4.5	0.15	1.15	4.4	0.15	8.4	30.0	7.6	0.00		0.00	0.67	5.7	0.11	2.5	12.0	0.9	0.0		0.0	6.2	0
2		136.chn	45	7.5	53	C11	7E+05	2E+06	8.1	4.4	1.1	0.93	5.0	0.14	1.15	4.4	0.15	3.9	33.0	3.9	0.00		0.00	0.64	6.1	0.12	2.4	12.3	0.9	0.0		0.0	5.9	0
2		143.chn	45	7.5	53	D11	7E+05	2E+06	8.1	4.4	1.1	1.13	4.5	0.15	1.17	4.4	0.15	0.0		4.1	0.17	27.2	0.13	0.76	5.3	0.12	4.3	7.4	0.9	0.0		0.0	6.4	0
2		159.chn	45	7.5	53	E11	7E+05	2E+06	8.1	4.4	1.1	0.86	5.4	0.14	1.19	4.3	0.15	0.0		4.1	0.00		0.00	0.81	5.2	0.13	6.9	4.7	1.0	0.0		0.0	6.1	0
2		164.chn	45	7.5	53	F11	7E+05	2E+06	14.1	3.3	1.4	1.03	5.0	0.15	1.58	3.7	0.18	5.0	27.4	4.1	0.19	27.3	0.16	0.34	10.3	0.10	1.0	30.6	0.9	0.0		0.0	7.7	0
2		192.chn	45	7.5	53	G11	7E+05	2E+06	13.2	3.4	1.3	0.84	5.6	0.14	1.30	4.1	0.16	0.0		4.1	0.00		0.00	0.16	16.5	0.08	0.0		0.0	0.0		0.0	6.6	0
2		201.chn	45	7.5	53	H11	7E+05	2E+06	13.6	3.4	1.4	1.09	4.8	0.16	1.44	4.0	0.17	0.0		4.1	0.00		0.00	0.48	7.6	0.11	5.9	5.8	1.0	0.0		0.0	8.1	0
2		237.chn	45	7.5	53	I11	7E+05	2E+06	12.9	3.5	1.4	1.27	4.5	0.17	1.60	3.8	0.18	0.0		4.1	0.00		0.00	0.67	6.3	0.13	4.9	7.0	1.0	0.0		0.0	8.9	0
2		244.chn	45	7.5	53	J11	7E+05	2E+06	11.3	3.7	1.3	1.06	4.9	0.16	1.44	4.0	0.17	0.0		4.1	0.00		0.00	0.65	6.2	0.12	3.5	9.5	1.0	0.0		0.0	7.7	0
2		272.chn	45	7.5	53	K11	7E+05	2E+06	10.4	3.9	1.2	0.97	5.1	0.15	1.44	3.9	0.17	0.0		4.1	0.15	32.5	0.15	0.67	5.8	0.12	3.2	10.0	1.0	0.0		0.0	7.1	0
2		279.chn	45	7.5	53	L11	7E+05	2E+06	9.3	4.1	1.1	1.02	4.8	0.15	1.34	4.1	0.16	0.0		4.1	0.00		0.00	0.44	7.8	0.10	1.7	18.3	0.9	0.0		0.0	6.8	0
2		313.chn	45	7.5	53	M11	7E+05	2E+06	12.9	3.5	1.4	1.04	5.1	0.16	1.38	4.1	0.17	4.7	30.2	4.2	0.00		0.00	0.17	17.0	0.09	0.0		0.0	0.0		0.0	7.8	0
2		120.chn	45	7.5	53	A12	7E+05	2E+06	9.3	4.1	1.1	0.97	5.0	0.15	1.18	4.4	0.16	0.0		4.1	0.00		0.00	0.62	6.1	0.11	1.8	15.7	0.9	0.0		0.0	5.7	0

OU	IHSS Number	File Name	Detector Array	Detector Height (m)	FOV m	Station	North feet	East feet	K-40 pCi/g	% Error	MDA pCi/g	Ra-226 pCi/g	% Error	MDA pCi/g	Th-232 pCi/g	% Error	MDA pCi/g	U-238 pCi/g	% Error	MDA pCi/g	U-235 pCi/g	% Error	MDA pCi/g	Cs-137 pCi/g	% Error	MDA pCi/g	Am-241 pCi/g	% Error	MDA pCi/g	Pu-239 nCi/g	% Error	MDA nCi/g	Exposure uR/h	% FOV Blocked
2		128.chn	45	7.5	53	B12	7E+05	2E+06	7.4	4.6	1.0	1.03	4.7	0.15	1.17	4.3	0.15	0.0		4.1	0.00		0.00	0.60	6.2	0.11	1.3	21.8	0.9	0.0		0.0	5.7	0
2		137.chn	45	7.5	53	C12	7E+05	2E+06	8.7	4.3	1.1	1.03	4.7	0.15	1.27	4.1	0.16	0.0		4.1	0.00		0.00	0.68	5.7	0.12	2.6	11.4	0.9	0.0		0.0	6.2	0
2		142.chn	45	7.5	53	D12	7E+05	2E+06	7.8	4.5	1.0	1.11	4.5	0.15	1.23	4.2	0.15	0.0		4.1	0.00		0.00	0.69	5.6	0.12	2.9	10.5	0.9	0.0		0.0	6.3	0
2		160.chn	45	7.5	53	E12	7E+05	2E+06	7.8	4.4	1.0	0.81	5.7	0.14	1.09	4.6	0.15	0.0		4.1	0.00		0.00	0.66	5.7	0.11	4.6	6.7	0.9	0.0		0.0	5.9	0
2		163.chn	45	7.5	53	F12	7E+05	2E+06	11.5	3.7	1.3	1.02	4.8	0.15	1.33	4.1	0.16	4.4	30.8	4.0	0.15	31.5	0.14	0.33	10.2	0.10	0.9	31.7	0.9	0.0		0.0	6.5	0
2		193.chn	45	7.5	53	G12	7E+05	2E+06	11.3	3.7	1.3	0.79	6.1	0.14	1.26	4.3	0.16	0.0		4.1	0.00		0.00	0.30	10.1	0.09	3.0	10.7	1.0	0.0		0.0	6.4	0
2		200.chn	45	7.5	53	H12	7E+05	2E+06	12.3	3.6	1.3	1.04	5.1	0.16	1.70	3.6	0.18	0.0		4.1	0.00		0.00	0.58	7.0	0.12	5.9	6.0	1.1	0.0		0.0	8.5	0
2		238.chn	45	7.5	53	I12	7E+05	2E+06	11.4	3.7	1.3	1.06	4.9	0.16	1.44	4.0	0.17	4.9	29.2	4.3	0.19	27.9	0.16	0.54	6.8	0.11	3.5	9.5	1.0	0.0		0.0	7.4	0
2		243.chn	45	7.5	53	J12	7E+05	2E+06	10.8	3.9	1.3	1.08	4.9	0.16	1.36	4.1	0.17	0.0		4.1	0.00		0.00	0.62	6.3	0.12	2.4	13.7	1.0	0.0		0.0	7.2	0
2		273.chn	45	7.5	53	K12	7E+05	2E+06	10.9	3.8	1.2	0.96	5.3	0.15	1.58	3.8	0.18			4.1	0.16	33.2	0.16	0.69	5.9	0.12	2.5	12.9	1.0	0.0		0.0	8.0	0
2		278.chn	45	7.5	53	L12	7E+05	2E+06	10.9	3.8	1.2	1.12	4.6	0.15	1.48	3.9	0.17	0.0		4.1	0.00		0.00	0.30	11.2	0.10	0.6	55.0	0.9	0.0		0.0	7.2	0
2		310.chn	45	7.5	53	M12	7E+05	2E+06	11.0	3.7	1.2	1.17	4.5	0.16	1.38	4.1	0.17	0.0		4.1	0.00		0.00	0.13	21.1	0.08	0.0		0.0	0.0		0.0	7.5	0
2		121.chn	45	7.5	53	A13	7E+05	2E+06	8.7	4.2	1.1	0.86	5.3	0.14	1.15	4.5	0.16	0.0		4.1	0.00		0.00	0.63	5.9	0.11	2.2	13.4	0.9	0.0		0.0	5.4	0
2		127.chn	45	7.5	53	B13	7E+05	2E+06	9.1	4.1	1.1	1.08	4.4	0.14	1.21	4.3	0.16	0.0		4.1	0.00		0.00	0.60	6.2	0.11	1.6	18.4	0.9	0.0		0.0	6.3	0
2		138.chn	45	7.5	53	C13	7E+05	2E+06	9.8	4.0	1.2	1.05	4.6	0.14	1.07	4.7	0.15	0.0		4.1	0.00		0.00	0.29	10.2	0.09	0.9	31.1	0.8	0.0		0.0	5.9	0
2		141.chn	45	7.5	53	D13	7E+05	2E+06	9.0	4.2	1.1	0.98	4.9	0.14	0.96	5.0	0.14	0.0		4.1	0.00		0.00	0.26	11.8	0.09	1.2	23.9	0.9	0.0		0.0	5.6	0
2		161.chn	45	7.5	53	E13	7E+05	2E+06	9.5	4.1	1.2	0.84	5.5	0.14	1.19	4.3	0.15	0.0		4.1	0.00		0.00	0.24	12.0	0.09	1.2	23.5	0.9	0.0		0.0	5.7	0
2		172.chn	45	7.5	53	F13	7E+05	2E+06	13.7	3.4	1.4	1.08	4.9	0.16	1.30	4.4	0.17	0.0		4.1	0.22	23.3	0.15	0.17	16.1	0.08	1.1	27.5	0.9	0.0		0.0	7.6	0
2		194.chn	45	7.5	53	G13	7E+05	2E+06	11.6	3.6	1.3	0.94	5.3	0.15	1.24	4.4	0.16	0.0		4.1	0.00		0.00	0.49	7.2	0.11	3.8	8.5	1.0	0.0		0.0	6.8	0
2		197.chn	45	7.5	53	H13	7E+05	2E+06	12.9	3.4	1.3	1.05	5.0	0.16	1.50	4.0	0.18	0.0		4.1	0.19	28.0	0.16	0.53	7.0	0.11	3.6	9.3	1.0	0.0		0.0	7.8	0
2		239.chn	45	7.5	53	I13	7E+05	2E+06	11.3	3.7	1.3	1.06	5.0	0.16	1.42	4.1	0.17	0.0		4.1	0.00		0.00	0.52	7.2	0.11	2.3	14.5	1.0	0.0		0.0	7.5	0
2		242.chn	45	7.5	53	J13	7E+05	2E+06	11.3	3.7	1.3	0.95	5.5	0.16	1.48	3.9	0.17	0.0		4.1	0.00		0.00	0.56	6.8	0.11	1.9	16.9	1.0	0.0		0.0	7.3	0
2		274.chn	45	7.5	53	K13	7E+05	2E+06	13.5	3.4	1.4	1.04	5.1	0.16	1.85	3.4	0.19	0.0		4.1	0.00		0.00	0.53	7.3	0.12	2.1	15.6	1.0	0.0		0.0	8.8	0
2		277.chn	45	7.5	53	L13	7E+05	2E+06	12.1	3.6	1.3	1.02	5.1	0.16	1.45	4.0	0.17	5.1	27.7	4.3	0.00		0.00	0.32	10.5	0.10	1.2	25.8	0.9	0.0		0.0	7.8	0
2		311.chn	45	7.5	53	M13	7E+05	2E+06	12.4	3.5	1.3	1.22	4.4	0.16	1.41	4.1	0.17	5.2	27.9	4.3	0.00		0.00	0.13	21.7	0.08	0.0		0.0	0.0		0.0	7.3	0
2		122.chn	45	7.5	53	A14	7E+05	2E+06	11.6	3.6	1.3	0.85	5.5	0.14	1.13	4.5	0.15	0.0		4.1	0.00		0.00	0.43	8.0	0.10	0.9	32.0	0.8	0.0		0.0	6.8	0
2		126.chn	45	7.5	53	B14	7E+05	2E+06	10.6	3.8	1.2	0.99	4.9	0.15	1.28	4.2	0.16	0.0		4.1	0.00		0.00	0.43	7.9	0.10	0.8	35.0	0.8	0.0		0.0	6.6	0
2		139.chn	45	7.5	53	C14	7E+05	2E+06	9.6	4.1	1.2	0.98	5.0	0.15	1.16	4.4	0.15	0.0		4.1	0.00		0.00	0.33	9.2	0.09	1.2	23.5	0.8	0.0		0.0	5.9	0
2		140.chn	45	7.5	53	D14	7E+05	2E+06	9.1	4.1	1.1	0.93	5.0	0.14	1.06	4.7	0.15	0.0		4.1	0.00		0.00	0.27	11.3	0.09	0.8	34.0	0.8	0.0		0.0	6.0	0
2		162.chn	45	7.5	53	E14	7E+05	2E+06	12.4	3.6	1.3	0.95	5.2	0.15	1.28	4.1	0.16	0.0		4.1	0.00		0.00	0.19	15.7	0.09	0.0		0.0	0.0		0.0	7.1	0
2		173.chn	45	7.5	53	F14	7E+05	2E+06	13.4	3.4	1.4	1.11	4.6	0.15	1.23	4.5	0.17	0.0		4.1	0.00		0.00	0.21	14.3	0.09	0.8	36.0	0.9	0.0		0.0	7.2	0
2		195.chn	45	7.5	53	G14	7E+05	2E+06	13.2	3.5	1.4	1.06	5.0	0.16	1.57	3.8	0.18	0.0		4.1	0.16	33.0	0.16	0.37	9.6	0.11	2.2	14.8	1.0	0.0		0.0	8.4	0
2		196.chn	45	7.5	53	H14	7E+05	2E+06	13.1	3.4	1.3	1.17	4.6	0.16	1.61	3.8	0.18	0.0		4.1	0.00		0.00	0.45	8.3	0.11	2.5	13.3	1.0	0.0		0.0	8.7	0
2		240.chn	45	7.5	53	I14	7E+05	2E+06	10.4	3.9	1.2	1.05	4.9	0.15	1.33	4.2	0.17	0.0		4.1	0.00		0.00	0.38	8.9	0.10	1.3	24.1	0.9	0.0		0.0	7.1	0
2		241.chn	45	7.5	53	J14	7E+05	2E+06	8.5	4.4	1.1	0.85	5.7	0.14	1.08	4.9	0.16	0.0		4.1	0.00		0.00	0.32	10.5	0.10	0.0		0.0	0.0		0.0	5.2	0
2		275.chn	45	7.5	53	K14	7E+05	2E+06	10.6	3.9	1.2	0.90	5.4	0.15	1.31	4.2	0.17	0.0		4.1	0.00		0.00	0.36	8.8	0.10	0.9	34.0	0.9	0.0		0.0	6.8	0
2		276.chn	45	7.5	53	L14	7E+05	2E+06	11.8	3.6	1.3	0.99	5.1	0.15	1.58	3.7	0.18	0.0		4.1	0.00		0.00	0.50	7.3	0.11	1.6	19.4	0.9	0.0		0.0	7.6	0
2		312.chn	45	7.5	53	M14	7E+05	2E+06	14.5	3.3	1.4	1.05	5.1	0.16	1.45	4.0	0.17	0.0		4.1	0.00		0.00	0.10	29.5	0.09	0.0		0.0	0.0		0.0	8.7	0
5		28.CHN	40227	1	12.4	E1	7E+05	2E+06	8.0	1.0	0.2	1.16	1.0	0.03	1.18	1.0	0.04	1.8	19.0	1.0	0.02	18.0	0.01	0.35	2.0	0.02	0.0		0.0	0.0		0.0	6.7	0
5		154.chn	1A66F	6.5	44	E01	7E+05	2E+06	6.5	1.0	0.2	0.76	1.0	0.02	0.89	1.0	0.03	1.0	16.0	0.5	0.05	9.0	0.01	0.25	1.0	0.01	0.0		0.0	0.0		0.0	5.2	0
5		23.CHN	30699	1	12.4	F1	7E+05	2E+06	15.3	1.0	0.5	1.52	1.0	0.05	2.69	1.0	0.08	2.2	22.0	1.5	0.07	12.0	0.02	0.49	2.0	0.03	0.0		0.0	0.0		0.0	12.9	0
5		137.chn	1A66F	6.5	44	F01	7E+05	2E+06	13.3	0.5	0.2	1.14	1.0	0.03	2.26	0.5	0.03	2.1	11.0	0.7	0.11	7.0	0.02	0.38	1.0	0.01	0.0		0.0	0.0		0.0	10.7	0
5		15.CHN	40279	1	12.4	G1	7E+05	2E+06	14.6	1.0	0.4	1.45	1.0	0.04	2.00	1.0	0.06	2.2	16.0	1.0	0.06	11.0	0.02	0.34	2.0	0.02	0.0		0.0	0.0		0.0	10.7	0
5		138.chn	1A66F	6.5	44	G01	7E+05	2E+06	12.1	0.5	0.2	0.90	1.0	0.03	1.69	0.5	0.03	2.0	10.0	0.6	0.10	7.0	0.02	0.36	1.0	0.01	0.0		0.0	0.0		0.0	8.6	0
5		29.CHN	40227	1	12.4	E2	7E+05	2E+06	15.6	1.0	0.5	1.15	1.0	0.03	2.00	1.0	0.06	1.7	24.0	1.2	0.12	10.0	0.04	0.52	2.0	0.03	0.0		0.0	0.0		0.0	10.5	0
5		205.chn	1A66F	6.5	44	E02	7E+05	2E+06	6.3	1.0	0.2	0.71	1.0	0.02	0.97	1.0	0.03	1.4	12.0	0.5	0.06	9.0	0.02	0.42	1.0	0.01	0.0		0.0	0.0		0.0	5.3	0
5		27.CHN	30687	1	12.4	F2	7E+05	2E+06	13.8	1.0	0.4	1.41	1.0	0.04	2.23	1.0	0.07	2.7	15.0	1.2	0.07	13.0	0.03	0.36	2.0	0.02	0.0		0.0	0.0		0.0	11.3	0
5		136.chn	1A66F	6.5	44	F02	7E+05	2E+06	13.0	0.5	0.2	1.08	1.0	0.03	2.02	0.5	0.03	2.0	11.0	0.7	0.09	7.0	0.02	0.37	1.0	0.01	0.0		0.0	0.0		0.0	10.0	0
5		27.CHN	40293	1	12.4	G2	7E+05	2E+06	13.0	1.0	0.4	1.40	1.0	0.04	2.24	1.0	0.07	2.4	16.0	1.2	0.11	10.0	0.03	0.42	2.0	0.03	0.0		0.0	0.0		0.0	11.1	0

OU	IHSS Number	File Name	Detector Array	Detector Height (m)	FOV m	Station	North feet	East feet	K-40 pCi/g	% Error	MDA pCi/g	Ra-226 pCi/g	% Error	MDA pCi/g	Th-232 pCi/g	% Error	MDA pCi/g	U-238 pCi/g	% Error	MDA pCi/g	U-235 pCi/g	% Error	MDA pCi/g	Cs-137 pCi/g	% Error	MDA pCi/g	Am-241 pCi/g	% Error	MDA pCi/g	Pu-239 nCi/g	% Error	MDA nCi/g	Exposure uR/h	% FOV Blocked
5		139.chn	1A66F	6.5	44	G02	7E+05	2E+06	12.9	0.5	0.2	0.99	1.0	0.03	2.00	0.5	0.03	1.8	12.0	0.6	0.12	6.0	0.02	0.38	1.0	0.01	0.2	27.0	0.1	0.0		0.0	9.8	0
5		236.chn	1A66F	6.5	44	G02	7E+05	2E+06	12.9	0.5	0.2	1.05	1.0	0.03	2.02	0.5	0.03	2.1	10.0	0.6	0.09	7.0	0.02	0.37	1.0	0.01	0.0		0.0	0.0		0.0	10.0	0
5		32.CHN	40293	1	12.4	D3	7E+05	2E+06	6.4	1.0	0.2	1.61	1.0	0.05	0.84	1.0	0.03	1.7	14.0	0.7	0.01	17.0	0.00	0.39	2.0	0.02	0.0		0.0	0.0		0.0	7.0	0
5		22.CHN	30699	1	12.4	E3	7E+05	2E+06	6.5	1.0	0.2	1.09	1.0	0.03	0.90	1.0	0.03	0.0		0.0	0.01	20.0	0.01	0.27	2.0	0.02	0.0		0.0	0.0		0.0	6.8	0
5		206.chn	1A66F	6.5	44	E03	7E+05	2E+06	6.0	1.0	0.2	0.70	1.0	0.02	0.93	1.0	0.03	1.2	14.0	0.5	0.07	8.0	0.02	0.51	1.0	0.02	0.0		0.0	0.0		0.0	5.3	0
5		24.CHN	30699	1	12.4	F3	7E+05	2E+06	12.3	1.0	0.4	1.03	1.0	0.03	1.98	1.0	0.06	2.4	15.0	1.1	0.15	9.0	0.04	0.43	2.0	0.03	0.0		0.0	0.0		0.0	9.4	0
5		132.chn	1A66F	6.5	44	F03	7E+05	2E+06	13.0	0.5	0.2	0.98	1.0	0.03	2.00	0.5	0.03	1.6	13.0	0.6	0.12	6.0	0.02	0.41	1.0	0.01	0.0		0.0	0.0		0.0	9.6	0
5		190.chn	1A62F6F	6.5	44	D03	7E+05	2E+06	7.7	1.0	0.2	0.93	1.0	0.03	0.79	1.0	0.02	1.5	9.0	0.4	0.05	10.0	0.01	0.29	1.0	0.01	0.0		0.0	0.0		0.0	5.4	0
5		16.CHN	40279	1	12.4	G3	7E+05	2E+06	9.0	1.0	0.3	0.81	2.0	0.05	1.35	1.0	0.04	1.8	22.0	1.2	0.03	21.0	0.02	0.33	2.0	0.02	0.0		0.0	0.0		0.0	8.5	0
5		143.chn	1A66F	6.5	44	G03	7E+05	2E+06	10.6	0.5	0.2	1.20	1.0	0.04	1.76	0.5	0.03	1.8	12.0	0.6	0.09	7.0	0.02	0.40	1.0	0.01	0.0		0.0	0.0		0.0	8.9	0
5		35.CHN	40227	1	12.4	D4	7E+05	2E+06	7.0	1.0	0.2	1.19	1.0	0.04	0.98	1.0	0.03	1.6	21.0	1.0	0.02	18.0	0.01	0.41	2.0	0.02	0.0		0.0	0.0		0.0	6.2	0
5		26.CHN	30687	1	12.4	E4	7E+05	2E+06	11.6	1.0	0.3	1.29	1.0	0.04	1.15	1.0	0.03	1.7	15.0	0.8	0.04	14.0	0.02	0.14	4.0	0.02	0.0		0.0	0.0		0.0	7.5	0
5		151.chn	1A66F	6.5	44	E04	7E+05	2E+06	10.8	0.5	0.2	0.88	1.0	0.03	1.05	1.0	0.03	1.1	18.0	0.6	0.04	10.0	0.01	0.20	2.0	0.01	0.0		0.0	0.0		0.0	6.7	0
5		28.CHN	30687	1	12.4	F4	7E+05	2E+06	13.5	1.0	0.4	1.01	1.0	0.03	1.77	1.0	0.05	1.5	24.0	1.1	0.11	10.0	0.03	0.45	2.0	0.03	0.0		0.0	0.0		0.0	9.2	0
5		133.chn	1A66F	6.5	44	F04	7E+05	2E+06	12.4	0.5	0.2	0.88	1.0	0.03	1.67	0.5	0.03	1.5	14.0	0.6	0.10	7.0	0.02	0.40	1.0	0.01	0.0		0.0	0.0		0.0	8.6	0
5		192.chn	1A62F6F	6.5	44	D04	7E+05	2E+06	8.3	1.0	0.2	1.00	1.0	0.03	1.00	1.0	0.03	1.2	16.0	0.6	0.06	8.0	0.01	0.38	1.0	0.01	0.0		0.0	0.0		0.0	6.1	0
5		28.CHN	40293	1	12.4	G4	7E+05	2E+06	13.7	1.0	0.4	1.12	1.0	0.03	2.14	1.0	0.06	2.7	15.0	1.2	0.15	9.0	0.04	0.47	2.0	0.03	0.0		0.0	0.0		0.0	10.4	0
5		144.chn	1A66F	6.5	44	G04	7E+05	2E+06	12.3	0.5	0.2	1.31	1.0	0.04	1.89	0.5	0.03	1.8	12.0	0.6	0.07	7.0	0.02	0.38	1.0	0.01	0.0		0.0	0.0		0.0	9.7	0
5		28.CHN	30699	1	12.4	D5	7E+05	2E+06	7.4	1.0	0.2	1.65	1.0	0.05	1.02	1.0	0.03	1.4	14.0	0.6	0.00	13.0	0.00	0.80	1.0	0.02	0.0		0.0	0.0		0.0	7.6	0
5		16.CHN	40293	1	12.4	D5	7E+05	2E+06	6.7	1.0	0.2	0.84	1.0	0.03	0.96	1.0	0.03	1.8	12.0	0.7	3.87	17.0	1.97	0.75	1.0	0.02	0.0		0.0	0.0		0.0	5.6	0
5		207.chn	1A66F	6.5	44	D05	7E+05	2E+06	7.6	1.0	0.2	0.75	1.0	0.02	0.93	1.0	0.03	1.2	14.0	0.5	0.08	7.0	0.02	0.48	1.0	0.01	0.0		0.0	0.0		0.0	5.6	0
5		27.CHN	40227	1	12.4	E5	7E+05	2E+06	12.2	1.0	0.4	1.59	1.0	0.05	1.39	1.0	0.04	1.6	29.0	1.4	0.00	19.0	0.00	0.26	3.0	0.02	0.0		0.0	0.0		0.0	8.9	0
5		152.chn	1A66F	6.5	44	E05	7E+05	2E+06	10.8	0.5	0.2	0.89	1.0	0.03	1.14	1.0	0.03	1.4	14.0	0.6	0.05	9.0	0.01	0.22	2.0	0.01	0.0		0.0	0.0		0.0	6.9	0
5		33.CHN	40293	1	12.4	F5	7E+05	2E+06	15.4	1.0	0.5	1.88	1.0	0.06	2.20	1.0	0.07	0.0		0.0	0.06	12.0	0.02	0.45	2.0	0.03	0.0		0.0	0.0		0.0	12.3	0
5		126.chn	1A66F	6.5	44	F05	7E+05	2E+06	14.2	0.5	0.2	1.00	1.0	0.03	1.92	0.5	0.03	1.9	12.0	0.7	0.10	7.0	0.02	0.40	1.0	0.01	0.0		0.0	0.0		0.0	9.9	0
5		17.CHN	40227	1	12.4	D6	7E+05	2E+06	14.5	1.0	0.4	0.97	1.0	0.03	1.49	1.0	0.04	0.0		0.0	0.08	13.0	0.03	0.44	2.0	0.03	0.0		0.0	0.0		0.0	8.9	0
5		213.chn	1A66F	6.5	44	D06	7E+05	2E+06	11.1	0.5	0.2	0.68	1.0	0.02	1.05	1.0	0.03	1.2	16.0	0.6	0.06	10.0	0.02	0.29	1.0	0.01	0.0		0.0	0.0		0.0	6.5	0
5		29.CHN	30699	1	12.4	E6	7E+05	2E+06	18.4	1.0	0.6	1.70	1.0	0.05	[illegible]	1.0	0.06	2.5	20.0	1.5	0.06	12.0	0.02	0.38	2.0	0.02	0.0		0.0	0.0		0.0	12.1	0
5		124.chn	1A66F	6.5	44	E06	7E+05	2E+06	15.9	0.5	0.2	0.99	1.0	0.03	1.69	0.5	0.03	2.0	11.0	0.6	0.08	8.0	0.02	0.33	1.0	0.01	0.1	46.0	0.1	0.0		0.0	9.6	0
5		219.chn	1A66F	6.5	44	E06	7E+05	2E+06	15.4	0.5	0.2	1.01	1.0	0.03	1.64	0.5	0.02	1.8	13.0	0.7	0.09	7.0	0.02	0.32	1.0	0.01	0.0		0.0	0.0		0.0	9.4	0
5		34.CHN	40227	1	12.4	F6	7E+05	2E+06	23.6	1.0	0.7	1.79	1.0	0.05	1.74	1.0	0.05	2.6	13.0	1.0	0.09	11.0	0.03	0.28	3.0	0.03	0.0		0.0	0.0		0.0	12.4	0
5	133.6	125.chn	1A66F	6.5	44	F06	7E+05	2E+06	18.7	0.5	0.3	1.24	1.0	0.04	1.63	1.0	0.05	2.0	11.0	0.7	0.11	6.0	0.02	0.28	1.0	0.01	0.0		0.0	0.0		0.0	10.5	0
5		12.CHN	30687	1	12.4	C7	7E+05	2E+06	14.3	1.0	0.4	1.00	1.0	0.03	0.96	1.0	0.03	2.0	12.0	0.7	0.04	16.0	0.02	0.14	4.0	0.02	0.0		0.0	0.0		0.0	7.2	0
5		189.chn	1A62F6F	6.5	44	C07	7E+05	2E+06	10.2	1.0	0.3	0.63	1.0	0.02	0.69	1.0	0.02	1.3	12.0	0.5	0.05	12.0	0.02	0.11	3.0	0.01	0.0		0.0	0.0		0.0	5.2	0
5		11.CHN	30699	1	12.4	D7	7E+05	2E+06	6.7	1.0	0.2	0.73	1.0	0.02	1.05	1.0	0.03	1.5	19.0	0.8	0.06	14.0	0.03	0.44	2.0	0.03	0.0		0.0	0.0		0.0	5.4	0
5	133.5	200.chn	1A62F6F	6.5	44	D07	7E+05	2E+06	13.7	0.5	0.2	0.80	1.0	0.02	1.12	1.0	0.03	1.5	17.0	0.8	0.06	11.0	0.02	0.18	2.0	0.01	0.0		0.0	0.0		0.0	7.1	0
5		33.CHN	30687	1	12.4	E7	7E+05	2E+06	16.3	1.0	0.5	1.56	1.0	0.05	2.07	1.0	0.06	2.9	10.0	0.9	0.06	12.0	0.02	0.45	2.0	0.03	0.0		0.0	0.0		0.0	11.6	0
5		123.chn	1A66F	6.5	44	E07	7E+05	2E+06	14.8	0.5	0.2	0.92	1.0	0.03	1.55	1.0	0.05	2.1	10.0	0.6	0.10	7.0	0.02	0.28	1.0	0.01	0.0		0.0	0.0		0.0	9.0	0
5		18.CHN	30699	1	12.4	F7	7E+05	2E+06	8.7	1.0	0.3	0.94	1.0	0.03	1.33	1.0	0.04	2.6	9.0	0.7	0.09	11.0	0.03	0.41	2.0	0.02	0.0		0.0	0.0		0.0	6.8	0
5	133.6	120.chn	1A66F	6.5	44	F07	7E+05	2E+06	15.0	0.5	0.2	1.06	1.0	0.03	2.03	0.5	0.03	2.3	10.0	0.7	0.11	7.0	0.02	0.39	1.0	0.01	0.0		0.0	0.0		0.0	10.5	0
5		33.CHN	40227	1	12.4	G7	7E+05	2E+06	13.2	1.0	0.4	1.73	1.0	0.05	2.18	1.0	0.07	3.0	14.0	1.3	0.04	14.0	0.02	0.40	2.0	0.02	0.0		0.0	0.0		0.0	11.3	0
5		212.chn	1A66F	6.5	44	G07	7E+05	2E+06	11.3	0.5	0.2	0.83	1.0	0.03	1.54	1.0	0.05	1.8	11.0	0.6	0.09	7.0	0.02	0.32	1.0	0.01	0.0		0.0	0.0		0.0	8.0	0
5		13.CHN	40293	1	12.4	C8	7E+05	2E+06	12.5	1.0	0.4	1.46	1.0	0.04	1.13	1.0	0.03	2.0	14.0	0.8	0.03	14.0	0.01	0.28	3.0	0.03	0.0		0.0	0.0		0.0	8.1	0
5		178.chn	1A66F	6.5	44	C08	7E+05	2E+06	11.5	0.5	0.2	0.91	1.0	0.03	1.01	1.0	0.03	1.7	12.0	0.6	0.07	8.0	0.02	0.17	2.0	0.01	0.0		0.0	0.0		0.0	6.7	0
5		25.CHN	40227	1	12.4	D8	7E+05	2E+06	20.9	1.0	0.6	0.93	1.0	0.03	0.96	1.0	0.03	1.6	21.0	1.0	0.04	17.0	0.02	0.05	11.0	0.02	0.0		0.0	0.0		0.0	8.2	0
5	133.5	199.chn	1A62F6F	6.5	44	D08	7E+05	2E+06	15.0	0.5	0.2	0.77	1.0	0.02	1.08	1.0	0.03	1.8	12.0	0.6	0.06	10.0	0.02	0.11	3.0	0.01	0.0		0.0	0.0		0.0	7.1	0
5		23.CHN	40293	1	12.4	E8	7E+05	2E+06	9.6	1.0	0.3	1.03	1.0	0.03	1.43	1.0	0.04	2.8	9.0	0.8	0.10	11.0	0.03	0.46	2.0	0.03	0.0		0.0	0.0		0.0	7.6	0
5		218.chn	1A66F	6.5	44	E08	7E+05	2E+06	15.1	0.5	0.2	1.03	1.0	0.03	1.60	1.0	0.05	2.2	10.0	0.7	0.11	7.0	0.02	0.28	1.0	0.01	0.0		0.0	0.0		0.0	9.2	0
5		17.CHN	30699	1	12.4	F8	7E+05	2E+06	15.4	1.0	0.5	1.32	1.0	0.04	2.22	1.0	0.07	7.6	6.0	1.4	0.19	8.0	0.05	0.33	2.0	0.02	0.0		0.0	0.0		0.0	11.2	0

OU	IHSS Number	File Name	Detector Array	Detector Height (m)	FOV m	Station	North feet	East feet	K-40 pCi/g	% Error	MDA pCi/g	Ra-226 pCi/g	% Error	MDA pCi/g	Th-232 pCi/g	% Error	MDA pCi/g	U-238 pCi/g	% Error	MDA pCi/g	U-235 pCi/g	% Error	MDA pCi/g	Cs-137 pCi/g	% Error	MDA pCi/g	Am-241 pCi/g	% Error	MDA pCi/g	Pu-239 nCi/g	% Error	MDA nCi/g	Exposure uR/h	% FOV Blocked
5	133.4	119.chn	1A66F	6.5	44	F08	7E+05	2E+06	13.1	0.5	0.2	0.89	1.0	0.03	1.74	0.5	0.03	2.6	8.0	0.6	0.10	7.0	0.02	0.32	1.0	0.01	0.0		0.0	0.0		0.0	9.0	0
5		23.CHN	30687	1	12.4	G8	7E+05	2E+06	9.0	1.0	0.3	0.97	1.0	0.03	1.36	1.0	0.04	2.7	9.0	0.7	0.10	11.0	0.03	0.42	2.0	0.03	0.0		0.0	0.0		0.0	7.1	0
5		145.chn	1A66F	6.5	44	G08	7E+05	2E+06	11.8	0.5	0.2	1.23	1.0	0.04	1.68	0.5	0.03	1.7	12.0	0.6	0.08	7.0	0.02	0.36	1.0	0.01	0.0		0.0	0.0		0.0	9.0	0
5		9.CHN	40293	1	12.4	C9	7E+05	2E+06	8.5	1.0	0.3	0.96	1.0	0.03	1.01	1.0	0.03	1.7	14.0	0.7	0.06	13.0	0.03	0.25	3.0	0.02	0.0		0.0	0.0		0.0	6.2	0
5		177.chn	1A66F	6.5	44	C09	7E+05	2E+06	7.8	1.0	0.2	0.67	1.0	0.02	0.72	1.0	0.02	1.6	9.0	0.4	0.07	9.0	0.02	0.18	2.0	0.01	0.0		0.0	0.0		0.0	5.2	0
5		16.CHN	40227	1	12.4	D9	7E+05	2E+06	10.4	1.0	0.3	0.93	1.0	0.03	1.22	1.0	0.04	1.5	28.0	1.2	0.02	23.0	0.01	0.20	3.0	0.02	0.0		0.0	0.0		0.0	7.0	0
5		198.chn	1A62F6F	6.5	44	D09	7E+05	2E+06	9.4	1.0	0.3	0.74	1.0	0.02	1.06	1.0	0.03	2.3	9.0	0.6	0.08	9.0	0.02	0.24	2.0	0.01	0.0		0.0	0.0		0.0	6.0	0
5		24.CHN	40227	1	12.4	E9	7E+05	2E+06	10.4	1.0	0.3	1.10	1.0	0.03	1.54	1.0	0.05	3.0	9.0	0.8	0.11	11.0	0.03	0.48	2.0	0.03	0.0		0.0	0.0		0.0	8.2	0
5		114.chn	1A66F	6.5	44	E09	7E+05	2E+06	9.4	0.5	0.1	0.73	1.0	0.02	1.14	1.0	0.03	3.4	6.0	0.6	0.12	6.0	0.02	0.33	1.0	0.01	0.0		0.0	0.0		0.0	9.8	0
5		22.CHN	40293	1	12.4	F9	7E+05	2E+06	10.1	1.0	0.3	1.08	1.0	0.03	1.54	1.0	0.05	2.4	15.0	1.1	0.08	12.0	0.03	0.31	2.0	0.02	0.0		0.0	0.0		0.0	8.0	0
5	133.4	118.chn	1A66F	6.5	44	F09	7E+05	2E+06	9.9	0.5	0.1	0.79	1.0	0.02	1.38	1.0	0.04	2.8	7.0	0.6	0.12	1.0	0.00	0.34	1.0	0.01	0.0		0.0	0.0		0.0	7.3	0
5		22.CHN	30687	1	12.4	G9	7E+05	2E+06	8.6	1.0	0.3	0.93	1.0	0.03	1.22	1.0	0.04	1.8	19.0	1.0	0.04	17.0	0.02	0.32	2.0	0.02	0.0		0.0	0.0		0.0	6.8	0
5		146.chn	1A66F	6.5	44	G09	7E+05	2E+06	9.7	0.5	0.1	1.12	1.0	0.03	1.44	1.0	0.04	2.3	9.0	0.6	0.06	8.0	0.01	0.37	1.0	0.01	0.0		0.0	0.0		0.0	7.7	0
5		11.chn	40227	1	12.4	C10	7E+05	2E+06	8.0	1.0	0.2	0.85	1.0	0.03	1.21	1.0	0.04	1.7	19.0	1.0	0.07	14.0	0.03	0.51	2.0	0.03	0.0		0.0	0.0		0.0	6.4	0
5		176.chn	1A66F	6.5	44	C10	7E+05	2E+06	8.9	1.0	0.3	1.00	1.0	0.03	1.10	1.0	0.03	1.6	12.0	0.6	0.05	9.0	0.01	0.43	1.0	0.01	0.0		0.0	0.0		0.0	6.7	0
5	133.1	28.chn	1a66f	6.5	44	B1	7E+05	2E+06	10.5	0.0	0.0	1.23	1.0	0.04	1.15	1.0	0.03	1.8	8.0	0.4	0.04	9.0	0.01	0.39	1.0	0.01	0.0		0.0	0.0		0.0	9.6	0
5		26.CHN	40227	1	12.4	D10	7E+05	2E+06	14.6	1.0	0.4	1.33	1.0	0.04	1.64	1.0	0.05	2.6	16.0	1.2	0.04	15.0	0.02	0.34	2.0	0.02	0.0		0.0	0.0		0.0	9.7	0
5	133.1	197.chn	1A66F	6.5	44	D10	7E+05	2E+06	10.8	0.5	0.2	0.77	1.0	0.02	1.21	1.0	0.04	2.0	10.0	0.6	0.07	8.0	0.02	0.28	1.0	0.01	0.0		0.0	0.0		0.0	6.9	0
5	133.1	39.chn	40227	1	12.4	A1	7E+05	2E+06	8.0	1.0	0.2	0.83	1.0	0.02	1.23	1.0	0.04	1.4	21.0	0.9	0.07	13.0	0.03	0.46	2.0	0.03	0.0		0.0	0.0		0.0	6.2	0
5	133.1	46.chn	40227	1	12.4	B1	7E+05	2E+06	7.0	1.0	0.2	0.73	1.0	0.02	0.99	1.0	0.03	1.9	11.0	0.6	0.08	12.0	0.03	0.48	2.0	0.03	0.0		0.0	0.0		0.0	5.5	0
5	133.1	41.chn	40227	1	12.4	C1	7E+05	2E+06	9.9	1.0	0.3	1.58	1.0	0.05	1.12	1.0	0.03	2.1	12.0	0.7	0.01	16.0	0.00	0.48	2.0	0.03	0.0		0.0	0.0		0.0	7.7	0
5		23.CHN	40227	1	12.4	E10	7E+05	2E+06	11.1	1.0	0.3	1.22	1.0	0.04	1.69	1.0	0.05	3.3	12.0	1.2	0.09	12.0	0.03	0.38	2.0	0.02	0.0		0.0	0.0		0.0	9.2	0
5		110.chn	1A66F	6.5	44	E10	7E+05	2E+06	11.7	0.5	0.2	0.94	1.0	0.03	1.62	0.5	0.02	3.9	5.0	0.6	0.14	5.0	0.02	0.31	1.0	0.01	0.0		0.0	0.0		0.0	8.5	0
5		16.CHN	30699	1	12.4	F10	7E+05	2E+06	9.4	1.0	0.3	1.20	1.0	0.04	1.49	1.0	0.04	21.7	1.0	0.7	0.38	4.0	0.05	0.48	2.0	0.03	0.0		0.0	0.0		0.0	8.6	0
5		117.chn	1A66F	6.5	44	F10	7E+05	2E+06	10.0	0.5	0.2	0.80	1.0	0.02	1.54	1.0	0.05	18.8	1.0	0.6	0.36	3.0	0.03	0.41	1.0	0.01	0.0		0.0	0.0		0.0	8.0	0
5	133.1	38.chn	40227	1	12.4	A2	7E+05	2E+06	7.9	1.0	0.2	0.92	1.0	0.03	1.15	1.0	0.03	1.4	22.0	0.9	0.06	13.0	0.02	0.59	1.0	0.02	0.0		0.0	0.0		0.0	6.2	0
5	133.1	38.chn	30687	1	12.4	B2	7E+05	2E+06	11.2	1.0	0.3	1.31	1.0	0.04	1.41	1.0	0.04	1.6	16.0	0.8	0.03	16.0	0.01	0.34	2.0	0.02	0.0		0.0	0.0		0.0	8.2	0
5	133.1	40.chn	40227	1	12.4	C2	7E+05	2E+06	10.4	1.0	0.3	1.44	1.0	0.04	1.16	1.0	0.03	1.5	21.0	0.9	0.00	17.0	0.00	0.23	3.0	0.02	0.0		0.0	0.0		0.0	7.6	0
5	133.1	37.chn	40227	1	12.4	A3	7E+05	2E+06	8.1	1.0	0.2	0.98	1.0	0.03	1.17	1.0	0.04	1.5	24.0	1.1	0.05	13.0	0.02	0.34	2.0	0.02	0.0		0.0	0.0		0.0	6.2	0
5	133.1	42.chn	40293	1	12.4	B3	7E+05	2E+06	12.4	1.0	0.4	0.89	1.0	0.03	1.30	1.0	0.04	2.0	22.0	1.3	0.05	16.0	0.02	0.36	2.0	0.02	0.0		0.0	0.0		0.0	7.6	0
5	133.1	45.chn	30687	1	12.4	C3	7E+05	2E+06	10.3	1.0	0.3	1.16	1.0	0.03	1.12	1.0	0.03	1.9	22.0	1.3	0.03	16.0	0.01	0.24	3.0	0.02	0.0		0.0	0.0		0.0	7.1	0
5	133.1	45.chn	40227	1	12.4	C3	7E+05	2E+06	9.5	1.0	0.3	0.82	1.0	0.02	1.06	1.0	0.03	1.4	16.0	0.7	0.07	13.0	0.03	0.22	3.0	0.02	0.0		0.0	0.0		0.0	7.3	0
5	133.1	49.chn	40277	1	12.4	C3	7E+05	2E+06	11.0	1.0	0.3	1.21	1.0	0.04	1.23	1.0	0.04	2.2	12.0	0.8	0.05	15.0	0.02	0.25	3.0	0.02	0.0		0.0	0.0		0.0	7.6	0
5	133.1	36.chn	40227	1	12.4	A4	7E+05	2E+06	9.8	1.0	0.3	0.94	1.0	0.03	1.24	1.0	0.04	1.7	21.0	1.1	0.05	14.0	0.02	0.35	2.0	0.02	0.0		0.0	0.0		0.0	6.7	0
5	133.1	43.chn	30687	1	12.4	B4	7E+05	2E+06	12.7	1.0	0.4	0.88	1.0	0.03	1.32	1.0	0.04	1.8	18.0	1.0	0.07	13.0	0.03	0.29	2.0	0.02	0.0		0.0	0.0		0.0	7.4	0
5	133.1	39.chn	30699	1	12.4	C4	7E+05	2E+06	10.1	1.0	0.3	0.95	1.0	0.03	1.20	1.0	0.04	2.2	13.0	0.8	0.07	14.0	0.03	0.33	2.0	0.02	0.0		0.0	0.0		0.0	7.3	0
5	133.1	42.chn	30687	1	12.4	A5	7E+05	2E+06	11.2	1.0	0.3	1.13	2.0	0.07	1.29	1.0	0.04	2.9	14.0	1.2	0.06	18.0	0.03	0.44	3.0	0.04	0.0		0.0	0.0		0.0	7.4	0
5	133.1	48.chn	40227	1	12.4	A5	7E+05	2E+06	12.4	1.0	0.4	1.24	1.0	0.04	1.43	1.0	0.04	2.1	17.0	1.1	0.05	13.0	0.02	0.48	2.0	0.03	0.0		0.0	0.0		0.0	8.4	0
5	133.1	44.chn	40227	1	12.4	B5	7E+05	2E+06	11.6	1.0	0.3	1.17	1.0	0.04	1.20	1.0	0.04	1.6	14.0	0.7	0.03	16.0	0.01	0.19	3.0	0.02	0.0		0.0	0.0		0.0	7.3	0
5	133.1	40.chn	40293	1	12.4	C5	7E+05	2E+06	7.7	1.0	0.2	0.98	1.0	0.03	0.85	2.0	0.05	2.9	23.0	2.0	0.01	25.0	0.01	0.22	3.0	0.02	0.0		0.0	0.0		0.0	6.4	0
5	133.1	40chn	30687	1	12.4	A6	7E+05	2E+06	12.1	1.0	0.4	1.29	1.0	0.04	1.24	1.0	0.04	1.7	15.0	0.8	0.03	16.0	0.01	0.62	1.0	0.02	0.0		0.0	0.0		0.0	8.0	0
5	133.1	41.chn	30687	1	12.4	B6	7E+05	2E+06	12.4	1.0	0.4	1.19	1.0	0.04	1.30	1.0	0.04	2.3	11.0	0.7	0.03	16.0	0.02	0.29	2.0	0.02	0.0		0.0	0.0		0.0	8.0	0
5	133.1	39.chn	40293	1	12.4	C6	7E+05	2E+06	10.8	1.0	0.3	1.24	1.0	0.04	1.29	1.0	0.04	1.9	14.0	0.8	0.02	19.0	0.01	0.38	2.0	0.02	0.0		0.0	0.0		0.0	7.9	0
5		10.chn	40227	1	12.4	C11	7E+05	2E+06	8.4	1.0	0.3	0.84	1.0	0.03	1.25	1.0	0.04	2.5	9.0	0.7	0.07	13.0	0.03	0.56	2.0	0.03	0.0		0.0	0.0		0.0	6.6	0
5		175.chn	1A66F	6.5	44	C11	7E+05	2E+06	8.2	1.0	0.2	1.00	1.0	0.03	1.05	1.0	0.03	1.4	13.0	0.6	0.08	7.0	0.02	0.43	1.0	0.01	0.0		0.0	0.0		0.0	6.3	0
5		14.CHN	40293	1	12.4	D11	7E+05	2E+06	9.5	1.0	0.3	1.18	1.0	0.04	1.23	1.0	0.04	1.9	13.0	0.7	0.05	14.0	0.02	0.22	3.0	0.02	0.0		0.0	0.0		0.0	7.3	0
5	133.1	113.chn	1A66F	6.5	44	D11	7E+05	2E+06	9.2	1.0	0.3	0.70	1.0	0.02	1.02	1.0	0.03	1.5	13.0	0.6	0.07	9.0	0.02	0.27	1.0	0.01	0.0		0.0	0.0		0.0	6.1	0
5	133.1	42.chn	40227	1	12.4	A7	7E+05	2E+06	9.7	1.0	0.3	1.16	1.0	0.03	1.15	1.0	0.03	2.0	11.0	0.7	0.04	11.0	0.01	0.57	1.0	0.02	0.0		0.0	0.0		0.0	7.6	0
5	133.1	43.chn	40227	1	12.4	B7	7E+05	2E+06	10.1	1.0	0.3	1.49	1.0	0.04	1.19	1.0	0.04	1.4	27.0	1.2	0.02	14.0	0.01	0.37	2.0	0.02	0.0		0.0	0.0		0.0	7.8	0

OU	IHSS Number	File Name	Detector Array	Detector Height (m)	FOV m	Station	North feet	East feet	K-40 pCi/g	% Error	MDA pCi/g	Ra-226 pCi/g	% Error	MDA pCi/g	Th-232 pCi/g	% Error	MDA pCi/g	U-238 pCi/g	% Error	MDA pCi/g	U-235 pCi/g	% Error	MDA pCi/g	Cs-137 pCi/g	% Error	MDA pCi/g	Am-241 pCi/g	% Error	MDA pCi/g	Pu-239 nCi/g	% Error	MDA nCi/g	Exposure uR/h	% FOV Blocked
5	133.1	38.chn	40293	1	12.4	B7	7E+05	2E+06	11.2	1.0	0.3	1.82	1.0	0.05	1.30	1.0	0.04	2.3	11.0	0.7	0.04	11.0	0.01	0.66	1.0	0.02	0.0		0.0	0.0		0.0	8.7	0
5	133.1	37.chn	30699	1	12.4	C7	7E+05	2E+06	12.8	1.0	0.4	1.52	1.0	0.05	1.65	1.0	0.05	2.1	19.0	1.2	0.04	14.0	0.02	0.34	2.0	0.02	0.0		0.0	0.0		0.0	9.7	0
5		22.CHN	40227	1	12.4	E11	7E+05	2E+06	15.9	1.0	0.5	1.40	1.0	0.04	2.23	1.0	0.07	3.9	8.0	0.9	0.16	9.0	0.04	0.45	2.0	0.03	0.0		0.0	0.0		0.0	11.9	0
5	133.3	108.chn	1A66F	6.5	44	E11	7E+05	2E+06	13.5	0.5	0.2	1.02	1.0	0.03	1.84	0.5	0.03	3.7	6.0	0.7	0.16	5.0	0.02	0.33	1.0	0.01	0.0		0.0	0.0		0.0	9.6	0
5		21.CHN	40293	1	12.4	F11	7E+05	2E+06	8.2	1.0	0.2	1.04	1.0	0.03	1.26	1.0	0.04	3.2	8.0	0.8	0.07	13.0	0.03	0.43	2.0	0.03	0.0		0.0	0.0		0.0	7.1	0
5	133.3	109.chn	1A66F	6.5	44	F11	7E+05	2E+06	9.4	0.5	0.1	0.84	1.0	0.03	1.36	1.0	0.04	2.8	7.0	0.6	0.11	6.0	0.02	0.38	1.0	0.01	0.0		0.0	0.0		0.0	7.1	0
5		21.CHN	30687	1	12.4	G11	7E+05	2E+06	11.8	1.0	0.4	1.07	1.0	0.03	1.87	1.0	0.06	2.9	9.0	0.8	0.08	13.0	0.03	0.33	2.0	0.02	0.0		0.0	0.0		0.0	9.2	0
5		105.chn	1A66F	6.5	44	G11	7E+05	2E+06	10.9	0.5	0.2	0.86	1.0	0.03	1.51	1.0	0.05	1.9	11.0	0.6	0.09	7.0	0.02	0.33	1.0	0.01	0.0		0.0	0.0		0.0	7.8	0
5		4.chn	40293	1	12.4	B12	7E+05	2E+06	13.5	1.0	0.4	0.88	1.0	0.03	1.01	1.0	0.03			0.0	0.06	14.0	0.02	0.15	4.0	0.02	0.0		0.0	0.0		0.0	6.8	0
5		169.chn	1A66F	6.5	44	B12	7E+05	2E+06	12.0	0.1	0.0	1.16	1.0	0.03	0.91	1.0	0.03	1.4	14.0	0.6	0.06	7.0	0.01	0.15	2.0	0.01	0.0		0.0	0.0		0.0	6.8	0
5		4.CHN	30687	1	12.4	C12	7E+05	2E+06	6.9	1.0	0.2	0.71	1.0	0.02	1.01	1.0	0.03	1.4	16.0	0.7	0.06	14.0	0.03	0.36	2.0	0.02	0.0		0.0	0.0		0.0	6.8	0
5		9.CHN	30699	1	12.4	C12	7E+05	2E+06	7.3	1.0	0.2	1.08	1.0	0.03	1.07	1.0	0.03	1.4	24.0	1.0	0.02	17.0	0.01	0.33	2.0	0.02	0.0		0.0	0.0		0.0	6.1	0
5		170.chn	1A66F	6.5	44	C12	7E+05	2E+06	7.6	1.0	0.2	0.87	1.0	0.03	0.97	1.0	0.03	1.2	14.0	0.5	0.07	7.0	0.02	0.30	1.0	0.01	0.0		0.0	0.0		0.0	5.7	0
5		10.CHN	30699	1	12.4	D12	7E+05	2E+06	9.9	1.0	0.3	1.07	1.0	0.03	1.05	1.0	0.03	1.2	20.0	0.7	0.02	19.0	0.01	0.24	3.0	0.02	0.0		0.0	0.0		0.0	6.8	0
5	133.1	235.chn	1A66F	6.5	44	D12	7E+05	2E+06	9.4	1.0	0.3	0.75	1.0	0.02	1.00	1.0	0.03	1.6	13.0	0.6	0.06	10.0	0.02	0.28	2.0	0.02	0.0		0.0	0.0		0.0	7.8	0
5		21.CHN	40227	1	12.4	E12	7E+05	2E+06	15.3	1.0	0.5	1.30	1.0	0.04	2.25	1.0	0.07	3.7	12.0	1.3	0.11	11.0	0.04	0.54	2.0	0.03	0.0		0.0	0.0		0.0	11.6	0
5	133.3	102.chn	1A66F	6.5	44	E12	7E+05	2E+06	12.7	0.5	0.2	0.91	1.0	0.03	1.75	0.5	0.03	3.5	6.0	0.6	0.15	5.0	0.02	0.40	1.0	0.01	0.0		0.0	0.0		0.0	8.9	0
5		20.CHN	40293	1	12.4	F12	7E+05	2E+06	10.9	1.0	0.3	1.06	1.0	0.03	1.50	1.0	0.05	2.8	9.0	0.8	1.50	13.0	0.59	0.41	2.0	0.02	0.0		0.0	0.0		0.0	8.2	0
5	133.3	103.chn	1A66F	6.5	44	F12	7E+05	2E+06	10.8	0.5	0.2	0.84	1.0	0.03	1.43	1.0	0.04	2.8	7.0	0.6	0.12	6.0	0.02	0.37	1.0	0.01	0.0		0.0	0.0		0.0	7.5	0
5		15.CHN	30699	1	12.4	G12	7E+05	2E+06	13.8	1.0	0.4	1.27	1.0	0.04	2.10	1.0	0.06	2.4	16.0	1.1	0.08	12.0	0.03	0.43	2.0	0.03	0.0		0.0	0.0		0.0	10.5	0
5		104.chn	1A66F	6.5	44	G12	7E+05	2E+06	12.6	0.5	0.2	0.99	1.0	0.03	1.82	0.5	0.03	2.2	10.0	0.7	0.09	7.0	0.02	0.37	1.0	0.01	0.0		0.0	0.0		0.0	9.3	0
5		4.chn	40227	1	12.4	B13	7E+05	2E+06	9.7	1.0	0.3	0.91	1.0	0.03	1.28	1.0	0.04	2.4	14.0	1.0	0.09	11.0	0.03	0.62	2.0	0.04	0.0		0.0	0.0		0.0	6.9	0
5		167.chn	1A66F	6.5	44	B13	7E+05	2E+06	8.5	1.0	0.3	0.80	1.0	0.02	1.03	1.0	0.03	1.5	9.0	0.4	0.06	9.0	0.02	0.37	1.0	0.01	0.0		0.0	0.0		0.0	7.3	0
5		2.CHN	30699	1	12.4	C13	7E+05	2E+06	9.4	1.0	0.3	0.87	1.0	0.03	1.39	1.0	0.04	2.3	14.0	1.0	0.08	12.0	0.03	0.81	1.0	0.02	0.0		0.0	0.0		0.0	7.2	0
5		183.chn	1A66F	6.5	44	C13	7E+05	2E+06	8.3	1.0	0.2	0.87	1.0	0.03	1.18	1.0	0.04	1.6	11.0	0.5	0.06	8.0	0.02	0.60	1.0	0.02	0.0		0.0	0.0		0.0	6.5	0
5		15.CHN	40227	1	12.4	D13	7E+05	2E+06	6.5	1.0	0.2	1.48	1.0	0.04	1.14	1.0	0.03	1.8	13.0	0.7	0.03	13.0	0.01	0.68	1.0	0.02	0.0		0.0	0.0		0.0	7.0	0
5		184.chn	1A66F	6.5	44	D13	7E+05	2E+06	6.4	1.0	0.2	0.74	1.0	0.02	0.90	1.0	0.03	1.5	11.0	0.5	0.06	9.0	0.02	0.47	1.0	0.01	0.0		0.0	0.0		0.0	5.3	0
5		20.CHN	40227	1	12.4	E13	7E+05	2E+06	8.9	1.0	0.3	1.04	1.0	0.03	1.36	1.0	0.04	2.1	19.0	1.2	0.07	13.0	0.03	0.38	2.0	0.02	0.0		0.0	0.0		0.0	7.3	0
5	133.3	96.chn	1A66F	6.5	44	E13	7E+05	2E+06	9.6	0.5	0.1	0.81	1.0	0.02	1.31	1.0	0.04	1.9	10.0	0.6	0.09	7.0	0.02	0.36	1.0	0.01	0.0		0.0	0.0		0.0	6.9	0
5	133.3	97.chn	1A66F	6.5	44	F13	7E+05	2E+06	15.1	0.5	0.2	1.19	1.0	0.04	2.32	0.5	0.03	3.6	7.0	0.7	0.16	5.0	0.02	0.53	1.0	0.02	0.0		0.0	0.0		0.0	11.3	0
5		19.CHN	40293	1	12.4	F13	7E+05	2E+06	12.9	1.0	0.4	1.33	1.0	0.04	2.13	1.0	0.06	3.8	11.0	1.2	0.11	10.0	0.03	0.50	2.0	0.03	0.0		0.0	0.0		0.0	10.9	0
5		14.CHN	30699	1	12.4	G13	7E+05	2E+06	15.9	1.0	0.5	1.45	1.0	0.04	2.29	1.0	0.07	4.0	7.0	0.8	0.15	8.0	0.04	0.52	2.0	0.03	0.0		0.0	0.0		0.0	11.7	0
5		31.CHN	40293	1	12.4	G13	7E+05	2E+06	14.9	1.0	0.4	1.39	1.0	0.04	2.21	1.0	0.07	3.5	12.0	1.3	0.14	9.0	0.04	0.48	2.0	0.03	0.0		0.0	0.0		0.0	11.3	0
5		98.chn	1A66F	6.5	44	G13	7E+05	2E+06	15.1	0.5	0.2	1.12	1.0	0.03	2.13	0.5	0.03	3.6	7.0	0.8	0.17	5.0	0.02	0.49	1.0	0.01	0.0		0.0	0.0		0.0	10.8	0
5		20.CHN	30687	1	12.4	H13	7E+05	2E+06	13.1	1.0	0.4	1.07	1.0	0.03	1.80	1.0	0.05	2.6	10.0	0.8	0.11	10.0	0.03	0.54	2.0	0.03	0.0		0.0	0.0		0.0	9.3	0
5		27.CHN	30699	1	12.4	H13	7E+05	2E+06	13.3	1.0	0.4	1.13	1.0	0.03	1.90	1.0	0.06	2.5	8.0	0.6	0.07	11.0	0.02	0.59	1.0	0.02	0.0		0.0	0.0		0.0	9.7	0
5		93.chn	1A66F	6.5	44	H13	7E+05	2E+06	11.4	0.5	0.2	0.79	1.0	0.02	1.51	1.0	0.05	1.9	11.0	0.6	0.12	6.0	0.02	0.43	1.0	0.01	0.0		0.0	0.0		0.0	7.8	0
5		3.chn	40293	1	12.4	B14	7E+05	2E+06	10.0	1.0	0.3	0.78	1.0	0.02	1.36	1.0	0.04	2.1	12.0	0.7	0.06	15.0	0.03	0.48	2.0	0.03	0.0		0.0	0.0		0.0	6.9	0
5		168.chn	1A66F	6.5	44	B14	7E+05	2E+06	9.0	0.5	0.1	0.99	1.0	0.03	0.96	1.0	0.03	1.2	16.0	0.6	0.06	8.0	0.01	0.32	1.0	0.01	0.0		0.0	0.0		0.0	6.1	0
5		57.chn	1A66F	6.5	44	B14	7E+05	2E+06	8.2	1.0	0.2	0.78	1.0	0.02	0.96	1.0	0.03	1.2	15.0	0.6	0.04	11.0	0.01	0.35	1.0	0.01	0.0		0.0	0.0		0.0	7.0	0
5		14.CHN	40227	1	12.4	C14	7E+05	2E+06	6.2	1.0	0.2	1.77	1.0	0.05	1.13	1.0	0.03	1.3	25.0	1.0	0.00	15.0	0.00	0.94	1.0	0.03	0.0		0.0	0.0		0.0	7.4	0
5		162.chn	1A66F	6.5	44	C14	7E+05	2E+06	6.0	1.0	0.2	0.74	1.0	0.02	0.94	1.0	0.03	1.4	12.0	0.5	0.04	10.0	0.01	0.63	1.0	0.02	0.0		0.0	0.0		0.0	5.4	0
5		30.CHN	40227	1	12.4	D14	7E+05	2E+06	6.9	1.0	0.2	1.27	1.0	0.04	1.04	1.0	0.03	1.4	23.0	1.0	0.03	15.0	0.01	0.62	1.0	0.02	0.0		0.0	0.0		0.0	6.5	0
5		214.chn	1A66F	6.5	44	D14	7E+05	2E+06	9.0	0.5	0.1	0.73	1.0	0.02	1.17	1.0	0.04	1.7	11.0	0.6	0.07	8.0	0.02	0.46	1.0	0.01	0.0		0.0	0.0		0.0	6.4	0
5		19.CHN	40227	1	12.4	E14	7E+05	2E+06	10.3	1.0	0.3	1.27	1.0	0.04	1.30	1.0	0.04	2.4	15.0	1.1	0.05	14.0	0.02	0.39	2.0	0.02	0.0		0.0	0.0		0.0	7.9	0
5		90.chn	1A66F	6.5	44	E14	7E+05	2E+06	11.1	0.5	0.2	0.83	1.0	0.02	1.39	1.0	0.04	1.9	10.0	0.6	0.08	8.0	0.02	0.43	1.0	0.01	0.0		0.0	0.0		0.0	7.5	0
5		18.CHN	40293	1	12.4	F14	7E+05	2E+06	9.9	1.0	0.3	1.67	1.0	0.05	1.51	1.0	0.05	2.5	10.0	0.7	0.04	12.0	0.02	0.42	2.0	0.02	0.0		0.0	0.0		0.0	9.0	0
5		91.chn	1A66F	6.5	44	F14	7E+05	2E+06	10.2	0.5	0.2	0.83	1.0	0.02	1.47	1.0	0.04	2.1	9.0	0.6	0.09	8.0	0.02	0.40	1.0	0.01	0.0		0.0	0.0		0.0	7.5	0
5		13.CHN	30699	1	12.4	G14	7E+05	2E+06	10.7	1.0	0.3	1.57	1.0	0.05	1.65	1.0	0.05	2.1	17.0	1.1	0.02	15.0	0.01	0.44	2.0	0.03	0.0		0.0	0.0		0.0	9.3	0

OU	IHSS Number	File Name	Detector Array	Detector Height (m)	FOV m	Station	North feet	East feet	K-40 pCi/g	% Error	MDA pCi/g	Ra-226 pCi/g	% Error	MDA pCi/g	Th-232 pCi/g	% Error	MDA pCi/g	U-238 pCi/g	% Error	MDA pCi/g	U-235 pCi/g	% Error	MDA pCi/g	Cs-137 pCi/g	% Error	MDA pCi/g	Am-241 pCi/g	% Error	MDA pCi/g	Pu-239 nCi/g	% Error	MDA nCi/g	Exposure uR/h	% FOV Blocked
5		92.chn	1A66F	6.5	44	G14	7E+05	2E+06	11.6	0.5	0.2	0.86	1.0	0.03	1.62	0.5	0.02	1.5	14.0	0.6	0.09	8.0	0.02	0.40	1.0	0.01	0.0		0.0	0.0		0.0	8.4	0
5		19.CHN	30687	1	12.4	H14	7E+05	2E+06	8.7	1.0	0.3	1.21	1.0	0.04	1.42	1.0	0.04	2.0	12.0	0.7	0.07	12.0	0.02	0.46	2.0	0.03	0.0		0.0	0.0		0.0	7.8	0
5		99.chn	1A66F	6.5	44	H14	7E+05	2E+06	15.3	0.5	0.2	1.29	1.0	0.04	2.21	0.5	0.03	2.6	9.0	0.7	0.11	7.0	0.02	0.60	1.0	0.02	0.0		0.0	0.0		0.0	11.4	0
5		3.chn	40277	1	12.4	B15	7E+05	2E+06	7.3	2.0	0.4	0.70	2.0	0.04	1.12	1.0	0.03	1.5	20.0	0.9	0.09	13.0	0.03	0.36	2.0	0.02	0.0		0.0	0.0		0.0	6.8	0
5		29.chn	40293	1	12.4	B15	7E+05	2E+06	12.7	1.0	0.4	1.24	1.0	0.04	1.04	1.0	0.03	0.0		0.0	0.03	15.0	0.01	0.41	2.0	0.02	0.0		0.0	0.0		0.0	7.7	0
5		56.chn	1A66F	6.5	44	B15	7E+05	2E+06	11.6	0.5	0.2	0.82	1.0	0.02	0.91	1.0	0.03	1.1	17.0	0.6	0.06	9.0	0.02	0.34	1.0	0.01	0.0		0.0	0.0		0.0	6.3	0
5		3.CHN	30687	1	12.4	C15	7E+05	2E+06	7.5	1.0	0.2	0.82	1.0	0.02	1.25	1.0	0.04	2.1	17.0	1.1	0.07	13.0	0.03	0.61	1.0	0.02	0.0		0.0	0.0		0.0	6.4	0
5		161.chn	1A66F	6.5	44	C15	7E+05	2E+06	6.5	1.0	0.2	0.83	1.0	0.02	0.98	1.0	0.03	1.3	14.0	0.5	0.04	11.0	0.01	0.50	1.0	0.02	0.0		0.0	0.0		0.0	5.6	0
5		29.CHN	30687	1	12.4	D15	7E+05	2E+06	14.0	1.0	0.4	1.23	1.0	0.04	1.62	1.0	0.05	1.8	16.0	0.8	0.03	17.0	0.02	0.39	2.0	0.02	0.0		0.0	0.0		0.0	9.4	0
5	133.2	78.chn	1A66F	6.5	44	D15	7E+05	2E+06	12.5	0.5	0.2	0.85	1.0	0.03	1.43	1.0	0.04	1.6	13.0	0.6	0.10	7.0	0.02	0.33	1.0	0.01	0.0		0.0	0.0		0.0	8.0	0
5		18.CHN	40227	1	12.4	E15	7E+05	2E+06	17.6	1.0	0.5	1.68	1.0	0.05	2.38	1.0	0.07	2.9	15.0	1.3	0.07	12.0	0.03	0.50	1.0	0.02	0.0		0.0	0.0		0.0	13.0	0
5	133.2	79.chn	1A66F	6.5	44	E15	7E+05	2E+06	14.6	0.5	0.2	1.02	1.0	0.03	1.86	0.5	0.03	2.5	9.0	0.7	0.11	7.0	0.02	0.36	1.0	0.01	0.0		0.0	0.0		0.0	10.0	0
5		17.CHN	40293	1	12.4	F15	7E+05	2E+06	13.4	1.0	0.4	1.90	1.0	0.06	1.98	1.0	0.06	2.3	17.0	1.2	0.03	13.0	0.01	0.49	2.0	0.03	0.0		0.0	0.0		0.0	11.0	0
5		80.chn	1A66F	6.5	44	F15	7E+05	2E+06	13.2	0.5	0.2	1.01	1.0	0.03	1.81	0.5	0.03	2.3	9.0	0.6	0.11	6.0	0.02	0.42	1.0	0.01	0.0		0.0	0.0		0.0	9.4	0
5		12.CHN	30699	1	12.4	G15	7E+05	2E+06	12.1	1.0	0.4	1.82	1.0	0.05	1.97	1.0	0.06	1.9	20.0	1.1	0.05	12.0	0.02	0.47	2.0	0.03	0.0		0.0	0.0		0.0	10.6	0
5		81.chn	1A66F	6.5	44	G15	7E+05	2E+06	11.6	0.5	0.2	0.95	1.0	0.03	1.71	0.5	0.03	1.9	11.0	0.6	0.09	7.0	0.02	0.40	1.0	0.01	0.0		0.0	0.0		0.0	8.6	0
5		18.CHN	30687	1	12.4	H15	7E+05	2E+06	16.3	1.0	0.5	1.48	1.0	0.04	2.03	1.0	0.06	2.5	11.0	0.8	0.07	12.0	0.03	0.39	2.0	0.02	0.0		0.0	0.0		0.0	11.3	0
5		87.chn	1A66F	6.5	44	H15	7E+05	2E+06	14.9	0.5	0.2	1.14	1.0	0.03	1.83	0.5	0.03	2.1	11.0	0.7	0.09	7.0	0.02	0.37	1.0	0.01	0.0		0.0	0.0		0.0	10.0	0
5		2.chn	40293	1	12.4	B16	7E+05	2E+06	15.9	1.0	0.5	0.65	2.0	0.04	0.98	1.0	0.03	1.9	16.0	0.9	0.05	16.0	0.03	0.34	2.0	0.02	0.0		0.0	0.0		0.0	7.0	0
5		53.chn	1A66F	6.5	44	B16	7E+05	2E+06	11.3	0.5	0.2	0.61	1.0	0.02	0.76	1.0	0.02	1.5	25.0	1.1	0.04	11.0	0.01	0.27	1.0	0.01	0.0		0.0	0.0		0.0	5.7	0
5		2.CHN	30687	1	12.4	C16	7E+05	2E+06	4.5	1.0	0.1	0.64	2.0	0.04	0.85	1.0	0.03	1.4	15.0	0.6	0.04	19.0	0.02	0.72	1.0	0.02	0.0		0.0	0.0		0.0	4.7	0
5		129.chn	1A66F	6.5	44	C16	7E+05	2E+06	5.3	0.8	0.1	0.80	1.1	0.03	0.87	0.9	0.02	1.2	11.8	0.4	0.05	12.0	0.02	0.54	1.0	0.02	0.0		0.0	0.0		0.0	5.0	0
5		30.CHN	30687	1	12.4	D16	7E+05	2E+06	12.5	1.0	0.4	1.08	1.0	0.03	1.50	1.0	0.05	2.3	11.0	0.8	0.07	13.0	0.03	0.42	2.0	0.03	0.0		0.0	0.0		0.0	8.3	0
5	133.2	73.chn	1A66F	6.5	44	D16	7E+05	2E+06	12.6	0.5	0.2	1.03	1.0	0.03	1.36	1.0	0.04	1.5	14.0	0.6	0.09	7.0	0.02	0.32	1.0	0.01	0.0		0.0	0.0		0.0	8.4	0
5		8.CHN	30699	1	12.4	E16	7E+05	2E+06	14.5	1.0	0.4	1.12	1.0	0.03	1.91	1.0	0.06	2.2	18.0	1.2	0.11	11.0	0.04	0.39	2.0	0.02	0.0		0.0	0.0		0.0	9.9	0
5	133.2	74.chn	1A66F	6.5	44	E16	7E+05	2E+06	13.0	0.5	0.2	1.14	1.0	0.03	1.57	1.0	0.05	1.7	13.0	0.7	0.10	7.0	0.02	0.36	1.0	0.01	0.0		0.0	0.0		0.0	9.0	0
5		12.CHN	40293	1	12.4	F16	7E+05	2E+06	10.4	1.0	0.3	0.83	1.0	0.02	1.32	1.0	0.04	1.4	24.0	1.0	0.06	16.0	0.03	0.41	2.0	0.02	0.0		0.0	0.0		0.0	7.3	0
5		75.chn	1A66F	6.5	44	F16	7E+05	2E+06	11.4	0.5	0.2	1.11	1.0	0.03	1.38	1.0	0.04	1.8	11.0	0.6	0.10	6.0	0.02	0.40	1.0	0.01	0.0		0.0	0.0		0.0	8.0	0
5		12.CHN	40279	1	12.4	G16	7E+05	2E+06	12.6	1.0	0.4	1.09	1.0	0.03	1.82	1.0	0.05	2.6	10.0	0.8	0.08	123.0	0.30	0.41	2.0	0.02	0.0		0.0	0.0		0.0	9.4	0
5		84.chn	1A66F	6.5	44	G16	7E+05	2E+06	11.5	0.5	0.2	1.21	1.0	0.04	1.59	0.5	0.02	1.7	13.0	0.7	0.08	7.0	0.02	0.38	1.0	0.01	0.0		0.0	0.0		0.0	8.7	0
5		13.CHN	40227	1	12.4	H16	7E+05	2E+06	16.0	1.0	0.5	1.17	1.0	0.04	2.13	1.0	0.06	2.4	18.0	1.3	0.12	11.0	0.04	0.52	2.0	0.03	0.0		0.0	0.0		0.0	10.9	0
5		85.chn	1A66F	6.5	44	H16	7E+05	2E+06	13.0	0.5	0.2	1.13	1.0	0.03	1.73	0.5	0.03	1.8	12.0	0.6	0.09	7.0	0.02	0.39	1.0	0.01	0.0		0.0	0.0		0.0	9.4	0
5		1.CHN	30687	1	12.4	B17	7E+05	2E+06	7.6	1.0	0.2	0.68	1.0	0.02	1.03	1.0	0.03	1.8	17.0	0.9	0.04	18.0	0.02	0.75	1.0	0.02	0.0		0.0	0.0		0.0	5.8	0
5		52.chn	1A66F	6.5	44	B17	7E+05	2E+06	10.1	0.5	0.2	0.63	1.0	0.02	0.74	1.0	0.02	1.5	12.0	0.5	0.04	12.0	0.01	0.34	1.0	0.01	0.0		0.0	0.0		0.0	5.5	0
5		159.chn	1A66F	6.5	44	C17	7E+05	2E+06	4.3	1.0	0.1	0.56	1.0	0.02	0.61	1.0	0.02	1.3	14.0	0.5	0.03	16.0	0.01	0.38	1.0	0.01	0.0		0.0	0.0		0.0	3.7	0
5		25.CHN	30699	1	12.4	G17	7E+05	2E+06	12.5	1.0	0.4	1.51	1.0	0.05	1.67	1.0	0.05	1.7	21.0	1.1	0.06	12.0	0.02	0.46	2.0	0.03	0.0		0.0	0.0		0.0	9.5	0
5		31.CHN	40227	1	12.4	D17	7E+05	2E+06	12.8	1.0	0.4	1.57	1.0	0.05	1.75	1.0	0.05	2.2	12.0	0.8	0.06	12.0	0.02	0.49	2.0	0.03	0.0		0.0	0.0		0.0	9.9	0
5		67.chn	1A66F	6.5	44	D17	7E+05	2E+06	10.2	0.5	0.2	1.02	1.0	0.03	1.18	1.0	0.04	1.9	10.0	0.6	0.05	9.0	0.01	0.37	1.0	0.01	0.0		0.0	0.0		0.0	7.2	0
5		1.chn	40227	1	12.4	C17	7E+05	2E+06	5.6	1.0	0.2	0.72	1.0	0.02	1.03	1.0	0.03	1.5	14.0	0.6	0.04	19.0	0.02	0.83	1.0	0.02	0.0		0.0	0.0		0.0	5.5	0
5		6.CHN	30699	1	12.4	E17	7E+05	2E+06	14.2	1.0	0.4	1.22	1.0	0.04	1.84	1.0	0.06	2.0	19.0	1.2	0.07	13.0	0.03	0.55	2.0	0.03	0.0		0.0	0.0		0.0	9.9	0
5		68.chn	1A66F	6.5	44	E17	7E+05	2E+06	11.5	0.5	0.2	1.08	1.0	0.03	1.43	1.0	0.04	1.9	11.0	0.6	0.09	7.0	0.02	0.36	1.0	0.01	0.0		0.0	0.0		0.0	8.2	0
5		26.CHN	30699	1	12.4	F17	7E+05	2E+06	12.6	1.0	0.4	1.50	1.0	0.05	1.93	1.0	0.06	1.6	27.0	1.3	0.05	13.0	0.02	0.53	2.0	0.03	0.0		0.0	0.0		0.0	9.9	0
5		69.chn	1A66F	6.5	44	F17	7E+05	2E+06	10.7	0.5	0.2	1.09	1.0	0.03	1.38	1.0	0.04	1.6	13.0	0.6	0.07	8.0	0.02	0.38	1.0	0.01	0.0		0.0	0.0		0.0	8.1	0
5		70.chn	1A66F	6.5	44	G17	7E+05	2E+06	10.9	0.5	0.2	1.14	1.0	0.03	1.33	1.0	0.04	1.8	11.0	0.6	0.08	7.0	0.02	0.36	1.0	0.01	0.0		0.0	0.0		0.0	8.0	0
5		13.CHN	30687	1	12.4	H17	7E+05	2E+06	11.8	1.0	0.4	0.93	1.0	0.03	1.61	1.0	0.05	1.8	19.0	1.0	0.10	11.0	0.03	0.41	2.0	0.02	0.0		0.0	0.0		0.0	8.3	0
5		86.chn	1A66F	6.5	44	H17	7E+05	2E+06	10.8	0.5	0.2	0.97	1.0	0.03	1.42	1.0	0.04	1.7	12.0	0.6	0.07	8.0	0.02	0.33	1.0	0.01	0.0		0.0	0.0		0.0	7.7	0
5	115	10.txt	1093	1	12.6	W1	7E+05	2E+06	12.6	3.2	1.2	1.19	4.0	0.14	2.22	3.5	0.23	0.0		0.0	0.11	31.3	0.10	0.41	8.1	0.10	0.0		0.0	0.0		0.0	6.2	0
5	115	7.chn	45	7.5	53	A1	7E+05	2E+06	7.7	4.5	1.0	0.96	5.0	0.14	0.98	5.0	0.15	0.0		0.0	0.00		0.00	0.53	6.7	0.11	0.0		0.0	0.0		0.0	5.1	0
5	115	12.chn	45	7.5	53	B1	7E+05	2E+06	7.8	4.6	1.1	1.00	4.6	0.14	1.02	4.8	0.15	0.0		0.0	0.00		0.00	0.58	6.2	0.11	0.0		0.0	0.0		0.0	5.6	0

OU	IHSS Number	File Name	Detector Array	Detector Height (m)	FOV m	Station	North feet	East feet	K-40 pCi/g	% Error	MDA pCi/g	Ra-226 pCi/g	% Error	MDA pCi/g	Th-232 pCi/g	% Error	MDA pCi/g	U-238 pCi/g	% Error	MDA pCi/g	U-235 pCi/g	% Error	MDA pCi/g	Cs-137 pCi/g	% Error	MDA pCi/g	Am-241 pCi/g	% Error	MDA pCi/g	Pu-239 nCi/g	% Error	MDA nCi/g	Exposure uR/h	% FOV Blocked
5	115	20.chn	45	7.5	53	C1	7E+05	2E+06	10.0	3.9	1.2	0.94	5.3	0.15	1.31	4.3	0.17	0.0		0.0	0.00		0.00	0.53	7.0	0.11	0.0		0.0	0.0		0.0	6.7	0
5	115	58.chn	45	7.5	53	D1	7E+05	2E+06	10.7	3.8	1.2	1.38	4.0	0.17	1.60	3.7	0.18	0.0		0.0	0.00		0.00	0.48	7.7	0.11	0.0		0.0	0.0		0.0	8.2	0
5		25.CHN	30687	1	12.4	B18	7E+05	2E+06	9.0	1.0	0.3	1.31	1.0	0.04	0.97	1.0	0.03	1.2	25.0	0.9	3.45	13.0	1.35	0.65	1.0	0.02	0.0		0.0	0.0		0.0	7.1	0
5		51.chn	1A66F	6.5	44	B18	7E+05	2E+06	8.3	1.0	0.2	0.69	1.0	0.02	0.84	1.0	0.03	1.3	10.0	0.4	0.04	11.0	0.01	0.45	1.0	0.01	0.0		0.0	0.0		0.0	5.5	0
5		2.chn	40227	1	12.4	C18	7E+05	2E+06	5.4	1.0	0.2	0.71	1.0	0.02	0.98	1.0	0.03	1.6	19.0	0.9	0.07	14.0	0.03	0.68	1.0	0.02	0.0		0.0	0.0		0.0	5.3	0
5		58.chn	1A66F	6.5	44	C18	7E+05	2E+06	6.7	1.0	0.2	0.69	1.0	0.02	0.74	1.0	0.02	1.1	13.0	0.4	0.04	10.0	0.01	0.39	1.0	0.01	0.0		0.0	0.0		0.0	5.0	0
5		31.CHN	30687	1	12.4	D18	7E+05	2E+06	13.5	1.0	0.4	1.02	1.0	0.03	1.60	1.0	0.05	1.7	22.0	1.1	0.07	13.0	0.03	0.40	2.0	0.02	0.0		0.0	0.0		0.0	8.8	0
5		61.chn	1A66F	6.5	44	D18	7E+05	2E+06	10.7	0.5	0.2	0.90	1.0	0.03	1.21	1.0	0.04	1.6	12.0	0.6	0.06	8.0	0.02	0.36	1.0	0.01	0.0		0.0	0.0		0.0	7.3	0
5		32.CHN	40227	1	12.4	E18	7E+05	2E+06	9.2	1.0	0.3	1.12	1.0	0.03	1.34	1.0	0.04	1.9	18.0	1.0	0.05	15.0	0.02	0.46	2.0	0.03	0.0		0.0	0.0		0.0	7.5	0
5		62.chn	1A66F	6.5	44	E18	7E+05	2E+06	9.1	0.5	0.1	0.85	1.0	0.03	1.10	1.0	0.03	1.4	13.0	0.5	0.05	10.0	0.01	0.35	1.0	0.01	0.0		0.0	0.0		0.0	6.5	0
5		12.chn	40227	1	12.4	F18	7E+05	2E+06	13.1	1.0	0.4	1.15	1.0	0.03	1.68	1.0	0.05	2.5	13.0	1.0	0.08	15.0	0.04	0.54	2.0	0.03	0.0		0.0	0.0		0.0	9.4	0
5		63.chn	1A66F	6.5	44	F18	7E+05	2E+06	10.8	0.5	0.2	0.93	1.0	0.03	1.28	1.0	0.04	1.7	12.0	0.6	0.08	8.0	0.02	0.39	1.0	0.01	0.0		0.0	0.0		0.0	7.5	0
5		10.CHN	40293	1	12.4	G18	7E+05	2E+06	15.3	1.0	0.5	1.07	1.0	0.03	1.02	1.0	0.03	2.1	12.0	0.8	0.04	16.0	0.02	0.15	4.0	0.02	0.0		0.0	0.0		0.0	7.6	0
5		64.chn	1A66F	6.5	44	G18	7E+05	2E+06	11.1	0.5	0.2	1.01	1.0	0.03	1.56	1.0	0.05	1.7	12.0	0.6	0.06	9.0	0.02	0.34	1.0	0.01	0.0		0.0	0.0		0.0	8.3	0
5	115	11.txt	1093	1	12.6	W2	7E+05	2E+06	13.5	3.1	1.3	1.30	3.8	0.15	2.09	2.6	0.16	4.8	21.4	3.1	0.10	30.4	0.09	0.53	6.3	0.10	0.0		0.0	0.0		0.0	6.6	0
5	115	19.chn	45	7.5	53	C2	7E+05	2E+06	11.1	3.8	1.3	0.92	5.4	0.15	1.41	4.0	0.17	5.2	26.8	4.2	0.00		0.00	0.34	9.7	0.10	0.0		0.0	0.0		0.0	6.7	0
5	115	8.chn	45	7.5	53	A2	7E+05	2E+06	9.1	4.1	1.1	1.09	4.6	0.15	1.09	4.6	0.15	0.0		4.1	0.00		0.00	0.54	6.7	0.11	0.0		0.0	0.0		0.0	6.3	0
5	115	13.chn	45	7.5	53	B2	7E+05	2E+06	9.6	4.1	1.2	1.01	4.8	0.15	1.08	4.8	0.16	0.0		4.1	0.00		0.00	0.37	9.0	0.10	0.0		0.0	0.0		0.0	5.7	0
5	115	57.chn	45	7.5	53	D2	7E+05	2E+06	11.2	3.7	1.2	1.19	4.5	0.16	1.33	4.4	0.18	0.0		4.1	0.00		0.00	0.50	7.3	0.11	0.0		0.0	0.0		0.0	7.5	0
5	115	20.txt	1093	1	12.6	W3	7E+05	2E+06	8.5	4.0	1.0	2.76	2.2	0.18	1.28	3.7	0.14	2.9	33.2	2.9	0.00		0.00	0.44	7.4	0.10	0.0		0.0	0.0		0.0	6.6	0
5	115	9.chn	45	7.5	53	A3	7E+05	2E+06	9.7	4.0	1.2	1.11	4.5	0.15	1.22	4.3	0.16	0.0		4.1	0.00		0.00	0.36	9.1	0.10	0.0		0.0	0.0		0.0	6.4	0
5	115	43.chn	45	7.5	53	B3	7E+05	2E+06	10.9	3.8	1.2	0.95	5.2	0.15	1.12	4.6	0.15	0.0		4.1	0.00		0.00	0.16	17.1	0.08	0.0		0.0	0.0		0.0	6.2	0
5	115	23.chn	45	7.5	53	C3	7E+05	2E+06	13.5	3.4	1.4	1.04	5.1	0.16	1.53	4.0	0.18	0.0		4.1	0.00		0.00	0.24	13.6	0.10	0.0		0.0	0.0		0.0	8.3	0
5	115	56.chn	45	7.5	53	D3	7E+05	2E+06	12.5	3.6	1.4	1.24	4.6	0.17	1.62	3.8	0.18	6.5	34.0	6.6	0.00		0.00	0.40	9.2	0.11	0.0		0.0	0.0		0.0	8.8	0
5	115	61.chn	45	1	2.6	P3	7E+05	2E+06	10.4	3.6	1.1	0.79	9.6	0.23	1.23	6.6	0.24	363.0	0.7	7.6	6.68	2.2	0.44	0.00		0.00	0.0		0.0	0.0		0.0	18.8	0
5	115	19.txt	1093	1	12.6	W4	7E+05	2E+06	12.3	3.3	1.2	3.47	1.9	0.20	1.57	3.4	0.16	0.0		0.0	0.00		0.00	0.34	9.1	0.09	0.0		0.0	0.0		0.0	8.7	0
5	115	62.chn	45	1	2.6	P4	7E+05	2E+06	11.0	3.4	1.1	0.82	5.6	0.14	1.10	4.6	0.15	3.5	29.6	3.1	0.15	29.3	0.13	0.17	15.7	0.08	0.0		0.0	0.0		0.0	4.3	0
5	115	63.chn	45	7.5	19.4	P4A	7E+05	2E+06	13.9	3.2	1.3	1.16	5.0	0.17	1.38	4.3	0.18	0.0		4.1	0.00		0.00	0.17	20.0	0.10	0.0		0.0	0.0		0.0	5.1	0
5	115	10.chn	45	7.5	53	A4	7E+05	2E+06	6.6	4.9	1.0	1.00	4.8	0.14	1.01	4.9	0.15	0.0		4.1	0.00		0.00	0.38	8.4	0.10	0.0		0.0	0.0		0.0	5.2	0
5	115	44.chn	45	7.5	53	B4	7E+05	2E+06	8.0	4.5	1.1	1.02	4.9	0.15	1.01	5.0	0.15	0.0		4.1	0.00		0.00	0.14	19.8	0.08	0.0		0.0	0.0		0.0	5.4	0
5	115	24.chn	45	7.5	53	C4	7E+05	2E+06	13.5	3.4	1.4	1.12	4.8	0.16	1.58	3.7	0.18	0.0		4.1	0.00		0.00	0.21	14.6	0.09	0.0		0.0	0.0		0.0	8.6	0
5	115	55.chn	45	7.5	53	D4	7E+05	2E+06	13.5	3.3	1.3	1.12	4.6	0.15	1.66	3.5	0.17	0.0		4.1	0.28	20.8	0.17	0.44	8.0	0.11	0.0		0.0	0.0		0.0	9.0	0
5	115	18.txt	1093	1	12.6	W5	7E+05	2E+06	11.8	3.3	1.2	0.94	4.3	0.12	1.20	3.7	0.13	0.0		0.0	0.00		0.00	0.00		0.00	0.0		0.0	0.0		0.0	6.8	0
5	115	11.chn	45	7.5	53	A5	7E+05	2E+06	7.8	4.5	1.1	1.00	4.7	0.14	0.94	5.2	0.15	0.0		4.1	0.00		0.00	0.13	19.8	0.07	0.0		0.0	0.0		0.0	5.6	0
5	115	45.chn	45	7.5	53	B5	7E+05	2E+06	11.4	3.7	1.3	1.07	4.9	0.16	1.34	4.2	0.17	0.0		4.1	0.00		0.00	0.14	20.2	0.09	0.0		0.0	0.0		0.0	6.5	0
5	115	40.chn	45	7.5	53	C5	7E+05	2E+06	14.7	3.2	1.4	1.12	4.9	0.16	1.35	4.3	0.17	0.0		4.1	0.19	28.1	0.16	0.14	20.3	0.09	0.0		0.0	0.0		0.0	7.8	0
5	115	54.chn	45	7.5	53	D5	7E+05	2E+06	12.6	3.4	1.3	1.02	5.0	0.15	1.37	4.1	0.17	0.0		4.1	0.15	32.5	0.15	0.32	9.7	0.09	0.0		0.0	0.0		0.0	8.2	0
5	115	27.chn	45	7.5	53	A6	7E+05	2E+06	9.0	4.1	1.1	1.01	4.8	0.15	1.04	4.9	0.15	0.0		4.1	0.00		0.00	0.10	23.7	0.07	0.0		0.0	0.0		0.0	5.5	0
5	115	46.chn	45	7.5	53	B6	7E+05	2E+06	9.1	4.1	1.1	0.96	5.0	0.14	1.06	4.8	0.15	0.0		4.1	0.00		0.00	0.23	12.1	0.08	0.0		0.0	0.0		0.0	6.0	0
5	115	39.chn	45	7.5	53	C6	7E+05	2E+06	12.2	3.6	1.3	0.95	5.2	0.15	1.32	4.2	0.17	0.0		4.1	0.00		0.00	0.16	17.5	0.08	0.0		0.0	0.0		0.0	7.3	0
5	115	53.chn	45	7.5	53	D6	7E+05	2E+06	12.9	3.5	1.4	1.00	5.0	0.15	1.40	4.1	0.17	0.0		4.1	0.00		0.00	0.13	21.9	0.08	0.0		0.0	0.0		0.0	7.5	0
5	115	17.txt	1093	1	12.6	W6	7E+05	2E+06	12.6	3.2	1.2	1.05	4.2	0.13	1.28	3.5	0.13	0.0		0.0	0.00		0.00	0.11	21.0	0.07	0.0		0.0	0.0		0.0	4.8	0
5	115	16.txt	1093	1	12.6	W7	7E+05	2E+06	13.4	3.0	1.2	0.99	4.3	0.13	1.29	3.5	0.14	0.0		0.0	0.12	28.2	0.10	0.09	24.8	0.07	0.0		0.0	0.0		0.0	4.8	0
5	115	28.chn	45	7.5	53	A7	7E+05	2E+06	10.1	3.9	1.2	1.10	4.5	0.15	0.95	5.4	0.15	0.0		4.1	0.00		0.00	0.11	20.1	0.07	0.0		0.0	0.0		0.0	6.2	0
5	115	47.chn	45	7.5	53	B7	7E+05	2E+06	10.8	3.8	1.2	0.97	5.0	0.15	1.15	4.7	0.16	9.7	28.1	8.2	0.17	29.7	0.15	0.10	27.4	0.08	0.0		0.0	0.0		0.0	6.7	0
5	115	38.chn	45	7.5	53	C7	7E+05	2E+06	12.3	3.5	1.3	0.99	5.1	0.15	1.17	4.6	0.16	0.0		4.1	0.00		0.00	0.11	24.0	0.08	0.0		0.0	0.0		0.0	6.3	0
5	115	52.chn	45	7.5	53	D7	7E+05	2E+06	13.4	3.4	1.4	1.04	5.1	0.16	1.26	4.4	0.17	0.0		4.1	0.00		0.00	0.18	16.2	0.09	0.0		0.0	0.0		0.0	7.4	0
5	115	29.chn	45	7.5	53	A8	7E+05	2E+06	11.4	3.7	1.3	1.06	4.8	0.15	1.03	5.0	0.15	0.0		4.1	0.15	30.1	0.14	0.00		0.00	0.0		0.0	0.0		0.0	6.2	0
5	115	31.chn	45	7.5	53	B8	7E+05	2E+06	11.3	3.7	1.3	0.88	5.4	0.14	1.00	5.2	0.16	11.1	19.1	6.4	0.20	27.5	0.16	0.10	27.9	0.08	0.0		0.0	0.0		0.0	5.8	0

OU	IHSS Number	File Name	Detector Array	Detector Height (m)	FOV m	Station	North feet	East feet	K-40 pCi/g	% Error	MDA pCi/g	Ra-226 pCi/g	% Error	MDA pCi/g	Th-232 pCi/g	% Error	MDA pCi/g	U-238 pCi/g	% Error	MDA pCi/g	U-235 pCi/g	% Error	MDA pCi/g	Cs-137 pCi/g	% Error	MDA pCi/g	Am-241 pCi/g	% Error	MDA pCi/g	Pu-239 nCi/g	% Error	MDA nCi/g	Exposure uR/h	% FOV Blocked
5	115	37.chn	45	7.5	53	C8	7E+05	2E+06	11.5	3.7	1.3	0.96	5.1	0.15	1.16	4.6	0.16	5.8	24.4	4.2	0.21	25.2	0.16	0.08	34.0	0.08	0.0		0.0	0.0		0.0	6.3	0
5	115	65.chn	45	7.5	53	C8	7E+05	2E+06	10.1	3.7	1.1	1.04	5.0	0.16	0.98	5.4	0.16	6.6	14.9	3.0	0.00		0.00	0.00		0.00	0.0		0.0	0.0		0.0	6.3	0
5	115	51.chn	45	7.5	53	D8	7E+05	2E+06	13.2	3.4	1.3	1.13	4.6	0.16	1.36	4.2	0.17	0.0		4.1	0.26	22.1	0.17	0.21	14.3	0.09	0.0		0.0	0.0		0.0	7.6	0
5	115	15.txt	1093	1	12.6	W8	7E+05	2E+06	12.0	3.2	1.2	1.09	4.1	0.13	1.76	2.9	0.15	4.0	24.0	2.9	0.00		0.00	0.55	6.0	0.10	0.0		0.0	0.0		0.0	5.8	0
5	115	50.chn	45	7.5	53	D9	7E+05	2E+06	13.5	3.4	1.4	1.07	5.0	0.16	1.49	3.9	0.17	0.0		4.1	0.00		0.00	0.35	9.9	0.10	0.0		0.0	0.0		0.0	8.2	0
5	115	30.chn	45	7.5	53	A9	7E+05	2E+06	11.1	3.7	1.2	0.86	5.6	0.14	1.03	4.9	0.15	0.0		4.1	0.00		0.00	0.00		0.00	0.0		0.0	0.0		0.0	6.0	0
5	115	32.chn	45	7.5	53	B9	7E+05	2E+06	12.8	3.5	1.3	0.90	5.4	0.15	1.19	4.7	0.17	0.0		4.1	0.00		0.00	0.00		0.00	0.0		0.0	0.0		0.0	6.6	0
5	115	36.chn	45	7.5	53	C9	7E+05	2E+06	12.2	3.6	1.3	0.91	5.7	0.16	1.32	4.3	0.17	5.3	23.9	3.8	0.00		0.00	0.16	16.4	0.08	0.0		0.0	0.0		0.0	7.0	0
5	115	64.chn	45	7.5	19.4	C9	7E+05	2E+06	10.4	3.7	1.2	0.96	5.4	0.16	1.15	4.7	0.16	0.0		4.1	0.00		0.00	0.00		0.00	0.0		0.0	0.0		0.0	7.0	0
5	115	14.txt	1093	1	12.6	W9	7E+05	2E+06	14.8	2.9	1.3	1.06	4.3	0.14	1.73	3.0	0.16	0.0		0.0	0.21	19.9	0.13	0.52	6.4	0.10	0.0		0.0	0.0		0.0	6.3	0
5	115	16.chn	45	7.5	53	A10	7E+05	2E+06	8.1	4.5	1.1	0.82	5.6	0.14	0.91	5.4	0.15	0.0		4.1	0.00		0.00	0.00		0.00	0.0		0.0	0.0		0.0	4.9	0
5	115	33.chn	45	7.5	53	B10	7E+05	2E+06	12.9	3.5	1.4	0.91	5.6	0.15	1.33	4.3	0.17	5.9	24.3	4.3	0.00		0.00	0.12	23.4	0.08	0.0		0.0	0.0		0.0	7.5	0
5	115	35.chn	45	7.5	53	C10	7E+05	2E+06	12.4	3.5	1.3	1.11	4.8	0.16	1.41	4.2	0.18	0.0		4.1	0.27	21.2	0.17	0.10	26.3	0.08	0.0		0.0	0.0		0.0	7.6	0
5	115	49.chn	45	7.5	53	D10	7E+05	2E+06	14.0	3.3	1.4	1.17	4.7	0.16	1.53	4.0	0.18	0.0		4.1	0.23	24.5	0.17	0.41	8.6	0.11	0.0		0.0	0.0		0.0	8.4	0
5	115	13.txt	1093	1	12.6	W10	7E+05	2E+06	12.3	3.2	1.2	1.02	4.2	0.13	1.42	3.4	0.14	0.0		0.0	0.16	23.3	0.11	0.46	7.0	0.10	0.0		0.0	0.0		0.0	5.3	0
5	115	68.chn	45	7.5	19.4	P2	7E+05	2E+06	11.8	3.5	1.2	1.25	4.5	0.17	1.34	4.3	0.17	4.6	28.1	3.8	0.00		0.00	0.10	28.7	0.08	0.0		0.0	0.0		0.0	4.3	0
5	115	17.chn	45	7.5	53	A11	7E+05	2E+06	10.3	3.8	1.2	0.89	5.4	0.14	1.12	4.6	0.15	0.0		4.1	0.00		0.00	0.16	17.1	0.08	0.0		0.0	0.0		0.0	6.0	0
5	115	18.chn	45	7.5	53	B11	7E+05	2E+06	13.9	3.4	1.4	1.13	4.8	0.16	1.51	4.0	0.18	0.0		4.1	0.00		0.00	0.09	34.0	0.09	0.0		0.0	0.0		0.0	8.5	0
5	115	34.chn	45	7.5	53	C11	7E+05	2E+06	13.6	3.4	1.4	1.05	5.0	0.16	1.43	4.1	0.18	0.0		4.1	0.00		0.00	0.12	22.7	0.08	0.0		0.0	0.0		0.0	7.6	0
5	115	48.chn	45	7.5	53	D11	7E+05	2E+06	11.5	3.7	1.3	1.11	4.9	0.16	1.35	4.1	0.17	0.0		4.1	0.00		0.00	0.39	9.1	0.11	0.0		0.0	0.0		0.0	7.2	0
5	115	12.txt	1093	1	12.6	W11	7E+05	2E+06	14.1	3.0	1.3	1.13	4.1	0.14	1.59	3.2	0.15	4.4	22.4	3.0	0.00		0.00	0.52	6.1	0.10	0.0		0.0	0.0		0.0	5.9	0
5	209	110.chn	6A6	6.5	44	8H	7E+05	2E+06	9.1	0.4	0.1	0.66	0.7	0.01	0.85	0.6	0.02	1.9	6.2	0.3	0.09	5.9	0.02	0.50	0.8	0.01	0.0		0.0	0.0		0.0	5.5	0
6	156.2	313.chn	1A66F	6.5	44	G03	8E+05	2E+06	12.0	0.5	0.2	0.83	1.0	0.02	1.12	1.0	0.03	1.4	13.0	0.6	0.08	7.0	0.02	0.05	6.0	0.01	0.2	20.0	0.1	0.0		0.0	7.0	0
6	165	307.chn	1A66F	6.5	44	I03+25	8E+05	2E+06	14.8	0.5	0.2	0.82	1.0	0.02	1.04	1.0	0.03	1.6	12.0	0.6	0.07	8.0	0.02	0.05	6.0	0.01	0.4	11.0	0.1	0.0		0.0	7.1	0
6	165	308.chn	1A66F	6.5	44	J03+25	8E+05	2E+06	14.3	0.5	0.2	0.85	1.0	0.03	0.91	1.0	0.03	1.6	12.0	0.6	0.07	8.0	0.02	0.04	8.0	0.01	0.4	10.0	0.1	0.0		0.0	6.7	0
6	165	309.chn	1A66F	6.5	44	K03+25	8E+05	2E+06	14.2	0.5	0.2	0.88	1.0	0.03	0.82	1.0	0.02	1.8	11.0	0.6	0.06	8.0	0.02	0.03	9.0	0.01	0.5	8.0	0.1	0.0		0.0	6.4	0
6	156.2	268.chn	1A66F	6.5	44	F04	8E+05	2E+06	17.3	0.5	0.3	0.92	1.0	0.03	1.27	1.0	0.04	1.7	12.0	0.6	0.08	8.0	0.02	0.05	6.0	0.01	0.0		0.0	0.0		0.0	8.3	0
6	156.2	312.chn	1A66F	6.5	44	G04	8E+05	2E+06	12.4	0.5	0.2	0.90	1.0	0.03	1.20	1.0	0.04	1.3	16.0	0.6	0.07	8.0	0.02	0.06	5.0	0.01	0.2	21.0	0.1	0.0		0.0	7.2	0
6	156.2	314A.chn	1A66F	6.5	44	H04	8E+05	2E+06	12.5	1.0	0.4	0.81	1.0	0.02	1.15	1.0	0.03	2.0	16.0	1.0	0.06	16.0	0.03	0.09	6.0	0.02	0.4	21.0	0.2	0.0		0.0	7.0	0
6	156.2	317.chn	1A66F	6.5	44	H04	8E+05	2E+06	13.0	0.5	0.2	0.76	1.0	0.02	1.19	1.0	0.04	1.6	13.0	0.6	0.09	7.0	0.02	0.10	3.0	0.01	0.3	12.0	0.1	0.0		0.0	7.2	0
6	165	303.chn	1A66F	6.5	44	I04	8E+05	2E+06	12.5	0.5	0.2	0.79	1.0	0.02	1.13	1.0	0.03	1.5	13.0	0.6	0.07	8.0	0.02	0.25	1.0	0.01	1.0	4.0	0.1	0.0		0.0	6.9	0
6	165	302.chn	1A66F	6.5	44	J04	8E+05	2E+06	11.7	0.5	0.2	0.81	1.0	0.02	1.11	1.0	0.03	1.3	15.0	0.6	0.07	8.0	0.02	0.28	1.0	0.01	1.5	3.0	0.1	0.0		0.0	6.8	0
6	156.2	269.chn	1A66F	6.5	44	F05	8E+05	2E+06	11.6	0.5	0.2	0.72	1.0	0.02	1.05	1.0	0.03	1.3	15.0	0.6	0.07	9.0	0.02	0.08	4.0	0.01	0.0		0.0	0.0		0.0	6.3	0
6	156.2	323.chn	1A66F	6.5	44	G05	8E+05	2E+06	17.6	0.5	0.3	1.06	1.0	0.03	1.32	1.0	0.04	1.8	12.0	0.6	0.09	7.0	0.02	0.02	15.0	0.01	0.0		0.0	0.0		0.0	8.7	0
6	156.2	318.chn	1A66F	6.5	44	H05	8E+05	2E+06	12.5	0.5	0.2	0.80	1.0	0.02	1.15	1.0	0.03	1.5	13.0	0.6	0.09	7.0	0.02	0.09	3.0	0.01	0.4	11.0	0.1	0.0		0.0	7.1	0
6	165	304.chn	1A66F	6.5	44	I05	8E+05	2E+06	18.1	0.5	0.3	0.86	1.0	0.03	1.46	1.0	0.04	1.7	13.0	0.6	0.08	8.0	0.02	0.11	3.0	0.01	0.4	10.0	0.1	0.0		0.0	9.1	0
6	165	301.chn	1A66F	6.5	44	J05	8E+05	2E+06	14.9	0.5	0.2	0.75	1.0	0.02	0.97	1.0	0.03	1.4	14.0	0.6	0.08	8.0	0.02	0.07	4.0	0.01	0.4	11.0	0.1	0.0		0.0	6.9	0
6	156.2	252.chn	1A66F	6.5	44	F06	8E+05	2E+06	11.0	0.5	0.2	0.68	1.0	0.02	1.05	1.0	0.03	1.4	13.0	0.6	0.07	8.0	0.02	0.11	3.0	0.01	0.2	25.0	0.1	0.0		0.0	6.1	0
6	156.2	282.chn	1A66F	6.5	44	G06	8E+05	2E+06	17.0	0.5	0.3	0.80	1.0	0.02	1.21	1.0	0.04	1.7	12.0	0.6	0.05	10.0	0.02	0.01	26.0	0.01	0.0		0.0	0.0		0.0	7.8	0
6	156.2	324.chn	1A66F	6.5	44	H06	8E+05	2E+06	16.3	0.5	0.2	0.97	1.0	0.03	1.21	1.0	0.04	1.9	11.0	0.6	0.08	7.0	0.02	0.01	23.0	0.01	0.0		0.0	0.0		0.0	8.0	0
6	156.2	321.chn	1A66F	6.5	44	I06	8E+05	2E+06	14.5	0.5	0.2	0.72	1.0	0.02	1.19	1.0	0.04	1.4	14.0	0.6	0.07	8.0	0.02	0.09	3.0	0.01	0.3	15.0	0.1	0.0		0.0	7.4	0
6	156.2	251.chn	1A66F	6.5	44	F07	8E+05	2E+06	12.0	0.5	0.2	0.73	1.0	0.02	1.11	1.0	0.03	1.4	14.0	0.6	0.08	8.0	0.02	0.12	3.0	0.01	0.0		0.0	0.0		0.0	6.7	0
6	156.2	224.chn	1A66F	6.5	44	G07	8E+05	2E+06	11.7	0.5	0.2	0.81	1.0	0.02	1.04	1.0	0.03	1.6	11.0	0.5	0.06	9.0	0.02	0.02	12.0	0.01	0.1	29.0	0.1	0.0		0.0	8.2	0
6	156.2	283.chn	1A66F	6.5	44	H07	8E+05	2E+06	17.3	0.5	0.3	0.87	1.0	0.03	1.25	1.0	0.04	1.8	12.0	0.6	0.08	8.0	0.02	0.01	28.0	0.01	0.0		0.0	0.0		0.0	8.0	0
6	156.2	325.chn	1A66F	6.5	44	I07	8E+05	2E+06	16.8	0.5	0.3	0.89	1.0	0.03	1.22	1.0	0.04	1.5	14.0	0.6	0.08	8.0	0.02	0.02	18.0	0.01	0.0		0.0	0.0		0.0	7.9	0
6	156.2	322.chn	1A66F	6.5	44	J07	8E+05	2E+06	16.6	0.5	0.2	0.75	1.0	0.02	1.15	1.0	0.03	1.6	12.0	0.6	0.06	9.0	0.02	0.09	4.0	0.01	0.3	13.0	0.1	0.0		0.0	7.6	0
6	141	300.chn	1A66F	6.5	44	M07	8E+05	2E+06	18.6	0.5	0.3	0.77	1.0	0.02	1.09	1.0	0.03	1.6	13.0	0.6	0.07	8.0	0.02	0.03	9.0	0.01	0.3	14.0	0.1	0.0		0.0	8.0	0
6	156.2	270.chn	1A66F	6.5	44	E08	8E+05	2E+06	10.8	0.5	0.2	0.75	1.0	0.02	1.21	1.0	0.04	1.4	14.0	0.6	0.08	8.0	0.02	0.37	1.0	0.01	0.2	17.0	0.1	0.0		0.0	6.9	0
6	156.2	9.chn	1A62F6F	6.5	44	F08	8E+05	2E+06	11.9	0.5	0.2	0.89	1.0	0.03	1.16	1.0	0.03	1.4	16.0	0.7	0.09	8.0	0.02	0.08	4.0	0.01	0.2	28.0	0.1	0.0		0.0	6.8	0

OU	IHSS Number	File Name	Detector Array	Detector Height (m)	FOV m	Station	North feet	East feet	K-40 pCi/g	% Error	MDA pCi/g	Ra-226 pCi/g	% Error	MDA pCi/g	Th-232 pCi/g	% Error	MDA pCi/g	U-238 pCi/g	% Error	MDA pCi/g	U-235 pCi/g	% Error	MDA pCi/g	Cs-137 pCi/g	% Error	MDA pCi/g	Am-241 pCi/g	% Error	MDA pCi/g	Pu-239 nCi/g	% Error	MDA nCi/g	Exposure uR/h	% FOV Blocked
6	156.2	223.chn	1A66F	6.5	44	G08	8E+05	2E+06	13.5	0.5	0.2	0.96	1.0	0.03	1.00	1.0	0.03	1.5	13.0	0.6	0.06	8.0	0.01	0.01	27.0	0.01	0.0		0.0	0.0		0.0	7.3	0
6	156.2	242.chn	1A66F	6.5	44	H08	8E+05	2E+06	14.0	0.5	0.2	0.79	1.0	0.02	1.09	1.0	0.03	1.6	12.0	0.6	0.09	7.0	0.02	0.02	12.0	0.01	0.0		0.0	0.0		0.0	6.9	0
6	156.2	243.chn	1A66F	6.5	44	I08	8E+05	2E+06	12.1	0.5	0.2	0.67	1.0	0.02	0.97	1.0	0.03	1.2	16.0	0.6	0.06	10.0	0.02	0.02	12.0	0.01	0.0		0.0	0.0		0.0	6.1	0
6	156.2	284.chn	1A66F	6.5	44	J08	8E+05	2E+06	17.6	0.5	0.3	0.86	1.0	0.03	1.29	1.0	0.04	1.7	12.0	0.6	0.06	9.0	0.02	0.03	12.0	0.01	0.2	24.0	0.1	0.0		0.0	8.3	0
6	141	295.chn	1A66F	6.5	44	K08	8E+05	2E+06	17.8	0.5	0.3	0.85	1.0	0.03	1.30	1.0	0.04	1.7	12.0	0.6	0.11	7.0	0.02	0.06	6.0	0.01	0.3	15.0	0.1	0.0		0.0	8.5	0
6	141	296.chn	1A66F	6.5	44	L08	8E+05	2E+06	19.4	0.5	0.3	0.80	1.0	0.02	1.27	1.0	0.04	2.0	10.0	0.6	0.09	8.0	0.02	0.06	6.0	0.01	0.3	12.0	0.1	0.0		0.0	8.5	0
6	141	297.chn	1A66F	6.5	44	M08	8E+05	2E+06	20.3	0.5	0.3	0.78	1.0	0.02	1.35	1.0	0.04	1.6	13.0	0.6	0.09	8.0	0.02	0.05	6.0	0.01	0.2	18.0	0.1	0.0		0.0	8.9	0
6	141	288.chn	1A66F	6.5	44	M09	8E+05	2E+06	17.6	0.5	0.3	0.88	1.0	0.03	1.29	1.0	0.04	1.7	13.0	0.6	0.09	7.0	0.02	0.08	4.0	0.01	0.5	9.0	0.1	0.0		0.0	8.4	0
6	156.2	287.chn	1A66F	6.5	44	N09	8E+05	2E+06	15.8	0.5	0.2	0.88	1.0	0.03	1.27	1.0	0.04	1.7	12.0	0.6	0.07	8.0	0.02	0.13	3.0	0.01	0.7	6.0	0.1	0.0		0.0	8.1	0
6	156.2	271.chn	1A66F	6.5	44	E09	8E+05	2E+06	10.2	0.5	0.2	0.74	1.0	0.02	1.15	1.0	0.03	1.7	8.0	0.4	0.07	9.0	0.02	0.24	2.0	0.01	0.0		0.0	0.0		0.0	6.8	0
6	156.2	281.chn	1A66F	6.5	44	E09	8E+05	2E+06	11.0	0.5	0.2	0.80	1.0	0.02	1.19	1.0	0.04	1.7	11.0	0.6	0.08	8.0	0.02	0.24	2.0	0.01	0.0		0.0	0.0		0.0	6.8	0
6	156.2	8.chn	1A62F6F	6.5	44	F09	8E+05	2E+06	11.9	0.5	0.2	0.93	1.0	0.03	1.13	1.0	0.03	1.5	14.0	0.6	0.09	7.0	0.02	0.07	5.0	0.01	0.0		0.0	0.0		0.0	6.8	0
6	156.2	280.chn	1A66F	6.5	44	G09	8E+05	2E+06	14.7	0.5	0.2	0.90	1.0	0.03	1.13	1.0	0.03	1.6	12.0	0.6	0.08	7.0	0.02	0.02	12.0	0.01	0.0		0.0	0.0		0.0	7.2	0
6	156.2	241.chn	1A66F	6.5	44	H09	8E+05	2E+06	17.2	0.5	0.3	0.75	1.0	0.02	1.16	1.0	0.03	1.3	15.0	0.6	0.06	9.0	0.02	0.03	10.0	0.01	0.0		0.0	0.0		0.0	8.0	0
6	156.2	237.chn	1A66F	6.5	44	I09	8E+05	2E+06	13.0	0.5	0.2	0.76	1.0	0.02	1.13	1.0	0.03	1.5	13.0	0.6	0.08	8.0	0.02	0.06	5.0	0.01	0.2	17.0	0.1	0.0		0.0	7.0	0
6	141	294.chn	1A66F	6.5	44	J09	8E+05	2E+06	11.6	0.5	0.2	0.75	1.0	0.02	1.14	1.0	0.03	1.5	13.0	0.6	0.08	8.0	0.02	0.11	3.0	0.01	0.4	11.0	0.1	0.0		0.0	6.6	0
6	141	290.chn	1A66F	6.5	44	K09	8E+05	2E+06	12.5	0.5	0.2	0.77	1.0	0.02	1.25	1.0	0.04	1.6	12.0	0.6	0.10	7.0	0.02	0.16	2.0	0.01	0.3	13.0	0.1	0.0		0.0	7.2	0
6	141	289.chn	1A66F	6.5	44	L09	8E+05	2E+06	13.5	0.5	0.2	0.80	1.0	0.02	1.30	1.0	0.04	1.7	12.0	0.6	0.09	7.0	0.02	0.24	2.0	0.01	0.8	5.0	0.1	0.0		0.0	7.7	0
6	156.2	293.chn	1A66F	6.5	44	O09	8E+05	2E+06	15.3	0.5	0.2	0.90	1.0	0.03	1.17	1.0	0.04	1.6	13.0	0.6	0.09	7.0	0.02	0.16	2.0	0.01	0.4	9.0	0.1	0.0		0.0	7.9	0
6	156.2	259.chn	1A66F	6.5	44	E10	8E+05	2E+06	10.3	0.5	0.2	0.65	1.0	0.02	0.95	1.0	0.03	1.3	14.0	0.6	0.06	9.0	0.02	0.11	3.0	0.01	0.2	26.0	0.1	0.0		0.0	5.8	0
6	156.2	7.chn	1A62F6F	6.5	44	F10	8E+05	2E+06	12.1	0.5	0.2	0.94	1.0	0.03	1.10	1.0	0.03	1.6	13.0	0.6	0.07	9.0	0.02	0.05	7.0	0.01	0.0		0.0	0.0		0.0	6.8	0
6	156.2	227.chn	1A66F	6.5	44	G10	8E+05	2E+06	12.2	0.5	0.2	0.76	1.0	0.02	0.94	1.0	0.03	1.6	9.0	0.4	0.05	10.0	0.01	0.02	11.0	0.01	0.0		0.0	0.0		0.0	6.3	0
6	156.2	231.chn	1A66F	6.5	44	H10	8E+05	2E+06	12.6	0.5	0.2	0.79	1.0	0.02	1.15	1.0	0.03	1.5	13.0	0.6	0.06	9.0	0.02	0.08	4.0	0.01	0.2	18.0	0.1	0.0		0.0	6.8	0
6	156.2	275.chn	1A66F	6.5	44	D11	8E+05	2E+06	11.4	0.5	0.2	0.79	1.0	0.02	1.10	1.0	0.03	1.7	11.0	0.6	0.08	7.0	0.02	0.21	2.0	0.01	0.1	35.0	0.1	0.0		0.0	6.7	0
6	156.2	258.chn	1A66F	6.5	44	E11	8E+05	2E+06	10.4	0.5	0.2	0.81	1.0	0.02	1.01	1.0	0.03	1.4	13.0	0.5	0.09	7.0	0.02	0.09	3.0	0.01	0.0		0.0	0.0		0.0	6.0	0
6	156.2	3.chn	1A62F6F	6.5	44	F11	8E+05	2E+06	12.6	0.5	0.2	0.74	1.0	0.02	0.92	1.0	0.03	1.3	17.0	0.6	0.07	10.0	0.02	0.03	11.0	0.01	0.0		0.0	0.0		0.0	6.1	0
6	156.2	228.chn	1A66F	6.5	44	G11	8E+05	2E+06	13.1	0.5	0.2	1.02	1.0	0.03	1.19	1.0	0.04	1.5	13.0	0.6	0.07	7.0	0.02	0.04	7.0	0.01	0.0		0.0	0.0		0.0	7.4	0
6	156.2	230.chn	1A66F	6.5	44	H11	8E+05	2E+06	11.0	0.5	0.2	0.79	1.0	0.02	1.10	1.0	0.03	1.4	14.0	0.6	0.08	8.0	0.02	0.17	2.0	0.01	0.2	22.0	0.1	0.0		0.0	6.4	0
6	156.2	256.chn	1A66F	6.5	44	D12	8E+05	2E+06	10.7	0.5	0.2	0.92	1.0	0.03	0.91	1.0	0.03	1.3	18.0	0.7	0.06	9.0	0.02	0.09	3.0	0.01	0.0		0.0	0.0		0.0	8.0	0
6	156.2	257.chn	1A66F	6.5	44	E12	8E+05	2E+06	11.9	0.5	0.2	0.92	1.0	0.03	1.09	1.0	0.03	1.6	12.0	0.6	0.08	7.0	0.02	0.06	5.0	0.01	0.0		0.0	0.0		0.0	6.8	0
6	156.2	1.chn	1A62F6F	6.5	44	F12	8E+05	2E+06	14.9	0.5	0.2	0.85	1.0	0.03	1.21	1.0	0.04	1.4	16.0	0.7	0.08	9.0	0.02	0.04	8.0	0.01	0.0		0.0	0.0		0.0	7.5	0
6	156.2	229.chn	1A66F	6.5	44	G12	8E+05	2E+06	11.6	0.5	0.2	0.89	1.0	0.03	1.09	1.0	0.03	1.5	13.0	0.6	0.07	7.0	0.02	0.08	4.0	0.01	0.0		0.0	0.0		0.0	6.7	0
6	156.2	255.chn	1A66F	6.5	44	D13	8E+05	2E+06	11.5	0.5	0.2	0.98	1.0	0.03	1.03	1.0	0.03	1.4	14.0	0.6	0.07	7.0	0.02	0.09	4.0	0.01	0.0		0.0	0.0		0.0	8.3	0
6	156.2	262.chn	1A66F	6.5	44	E13	8E+05	2E+06	13.3	0.5	0.2	0.94	1.0	0.03	1.10	1.0	0.03	1.3	15.0	0.6	0.07	8.0	0.02	0.07	4.0	0.01	0.0		0.0	0.0		0.0	7.3	0
6	156.2	2.chn	1A62F6F	6.5	44	F13	8E+05	2E+06	11.1	0.5	0.2	0.77	1.0	0.02	1.07	1.0	0.03	1.4	15.0	0.6	0.08	8.0	0.02	0.11	3.0	0.01	0.0		0.0	0.0		0.0	6.2	0
6	156.2	274.chn	1A66F	6.5	44	C14	8E+05	2E+06	10.8	0.5	0.2	0.77	1.0	0.02	1.15	1.0	0.03	1.5	12.0	0.5	0.10	7.0	0.02	0.30	1.0	0.01	0.1	30.0	0.1	0.0		0.0	6.4	0
6	156.2	6.chn	1A62F6F	6.5	44	D14	8E+05	2E+06	11.8	0.5	0.2	0.98	1.0	0.03	1.10	1.0	0.03	1.3	16.0	0.6	0.07	9.0	0.02	0.11	3.0	0.01	0.0		0.0	0.0		0.0	6.8	0
6	156.2	276.chn	1A66F	6.5	44	E14	8E+05	2E+06	11.7	0.5	0.2	0.80	1.0	0.02	1.08	1.0	0.03	1.5	13.0	0.6	0.08	7.0	0.02	0.20	2.0	0.01	0.1	31.0	0.1	0.0		0.0	6.6	0
6	156.2	265.chn	1A66F	6.5	44	C15	8E+05	2E+06	10.2	0.5	0.2	0.70	1.0	0.02	1.16	1.0	0.03	1.2	16.0	0.6	0.08	8.0	0.02	0.46	1.0	0.01	0.2	21.0	0.1	0.0		0.0	6.7	0
6	156.2	263.chn	1A66F	6.5	44	D15	8E+05	2E+06	12.1	0.5	0.2	0.95	1.0	0.03	1.14	1.0	0.03	1.6	13.0	0.6	0.08	7.0	0.02	0.18	2.0	0.01	0.0		0.0	0.0		0.0	7.1	0
6	156.2	277.chn	1A66F	6.5	44	E15	8E+05	2E+06	10.4	0.5	0.2	0.75	1.0	0.02	1.18	1.0	0.04	1.4	13.0	0.5	0.08	8.0	0.02	0.44	1.0	0.01	0.2	26.0	0.1	0.0		0.0	6.7	0
6	156.2	264.chn	1A66F	6.5	44	D16	8E+05	2E+06	10.1	0.5	0.2	0.85	1.0	0.03	1.10	1.0	0.03	1.3	14.0	0.6	0.08	7.0	0.02	0.35	1.0	0.01	0.2	20.0	0.1	0.0		0.0	6.6	0
8	172	178.chn	4A6	6.5	44	4T	7E+05	2E+06	19.8	0.3	0.2	0.86	0.7	0.02	1.21	0.6	0.02	1.7	8.3	0.4	0.05	9.0	0.01	0.01	18.7	0.01	0.0		0.0	0.0		0.0	9.1	50
8	172	180.chn	4A6	6.5	44	4V	7E+05	2E+06	16.1	0.3	0.1	0.76	0.7	0.02	1.00	0.6	0.02	2.1	6.0	0.4	0.07	7.0	0.02	0.01	19.7	0.01	0.1	30.4	0.1	0.0		0.0	7.4	0
8	172	179.chn	4A6	6.5	44	4U	7E+05	2E+06	17.4	0.3	0.2	0.79	0.7	0.02	1.06	0.6	0.02	1.8	7.2	0.4	0.04	10.0	0.01	0.01	23.0	0.01	0.0		0.0	0.0		0.0	8.1	40
8	172	177.chn	4A6	6.5	44	4S	7E+05	2E+06	22.0	0.3	0.2	0.94	0.7	0.02	1.33	0.5	0.02	2.0	7.2	0.4	0.09	7.0	0.02	0.02	13.7	0.01	0.0		0.0	0.0		0.0	9.9	50
8	172	36.chn	6A6	6.5	44	6X	8E+05	2E+06	15.7	0.3	0.1	0.87	0.7	0.02	1.05	0.6	0.02	2.3	5.9	0.4	0.09	6.1	0.02	0.01	21.2	0.01	0.0		0.0	0.0		0.0	7.5	0
8	172	174.chn	4A6	6.5	44	4R	7E+05	2E+06	20.3	0.3	0.2	0.93	0.6	0.02	1.30	0.5	0.02	2.1	6.7	0.4	0.06	8.0	0.01	0.01	19.7	0.01	0.8	4.9	0.1	0.0		0.0	9.6	0
8	172	37.chn	6A6	6.5	44	6Y	8E+05	2E+06	17.1	0.3	0.2	0.94	0.6	0.02	1.28	0.5	0.02	2.2	6.2	0.4	0.08	7.1	0.02	0.04	7.4	0.01	0.0		0.0	0.0		0.0	8.5	0

OU	IHSS Number	File Name	Detector Array	Detector Height (m)	FOV m	Station	North feet	East feet	K-40 pCi/g	% Error	MDA pCi/g	Ra-226 pCi/g	% Error	MDA pCi/g	Th-232 pCi/g	% Error	MDA pCi/g	U-238 pCi/g	% Error	MDA pCi/g	U-235 pCi/g	% Error	MDA pCi/g	Cs-137 pCi/g	% Error	MDA pCi/g	Am-241 pCi/g	% Error	MDA pCi/g	Pu-239 nCi/g	% Error	MDA nCi/g	Exposure uR/h	% FOV Blocked
8	172	173.chn	4A6	6.5	44	4Q	7E+05	2E+06	20.9	0.3	0.2	0.95	0.6	0.02	1.35	0.5	0.02	2.0	7.0	0.4	0.05	8.0	0.01	0.04	7.6	0.01	5.1	0.9	0.1	0.0		0.0	9.7	0
8	172	38.chn	6A6	6.5	44	6Z	8E+05	2E+06	18.7	0.3	0.2	0.96	0.6	0.02	1.46	0.5	0.02	2.3	6.0	0.4	0.09	6.7	0.02	0.04	7.5	0.01	0.0		0.0	0.0		0.0	9.3	0
8	172	39.chn	6A6	6.5	44	7A	8E+05	2E+06	16.0	0.3	0.1	0.89	0.7	0.02	1.24	0.5	0.02	2.4	5.7	0.4	0.09	6.6	0.02	0.10	3.0	0.01	0.0		0.0	0.0		0.0	8.1	0
8	172	171.chn	4A6	6.5	44	4P	7E+05	2E+06	22.7	0.3	0.2	1.16	0.6	0.02	2.15	0.4	0.03	2.7	5.7	0.5	0.08	7.0	0.02	0.01	25.5	0.01	10.6	0.5	0.2	0.0		0.0	12.5	0
8	172	42.chn	6A6	6.5	44	7B	8E+05	2E+06	17.4	0.3	0.2	0.95	0.6	0.02	1.35	0.5	0.02	1.9	7.3	0.4	0.08	7.1	0.02	0.04	7.3	0.01	0.0		0.0	0.0		0.0	8.7	0
8	172	172.chn	4A6	6.5	44	4O	7E+05	2E+06	19.7	0.3	0.2	1.02	0.6	0.02	1.54	0.5	0.02	3.3	4.6	0.5	0.08	7.0	0.02	0.01	26.1	0.01	19.1	0.3	0.2	0.5	26.9	0.4	10.3	0
8	172	45.chn	6A6	6.5	44	7C	8E+05	2E+06	19.7	0.3	0.2	1.10	0.6	0.02	1.44	0.5	0.02	2.6	5.7	0.4	0.10	5.9	0.02	0.04	7.4	0.01	0.0		0.0	0.0		0.0	9.6	0
8	172	46.chn	6A6	6.5	44	7D	8E+05	2E+06	20.1	0.3	0.2	0.96	0.6	0.02	1.35	0.5	0.02	2.2	6.6	0.4	0.08	7.3	0.02	0.01	25.7	0.01	0.0		0.0	0.0		0.0	9.3	10
8		183.chn	4A6	6.5	44	4W	7E+05	2E+06	18.4	0.3	0.2	1.03	0.6	0.02	1.15	0.6	0.02	5.8	2.6	0.5	0.07	8.0	0.02	0.00		0.00	0.0		0.0	0.0		0.0	8.9	50
8		186.chn	4A6	6.5	44	4Z	7E+05	2E+06	21.4	0.3	0.2	1.25	0.5	0.02	1.91	0.4	0.02	3.3	4.7	0.5	0.07	7.0	0.01	0.01	45.0	0.01	0.0		0.0	0.0		0.0	11.6	10
8		185.chn	4A6	6.5	44	4Y	7E+05	2E+06	19.9	0.3	0.2	1.22	0.5	0.02	1.84	0.4	0.02	3.2	4.7	0.5	0.06	8.0	0.02	0.01	35.0	0.01	0.0		0.0	0.0		0.0	11.2	40
8		184.chn	4A6	6.5	44	4X	7E+05	2E+06	19.4	0.3	0.2	1.16	0.6	0.02	1.81	0.4	0.02	2.6	5.6	0.4	0.06	8.0	0.01	0.01	29.7	0.01	0.0		0.0	0.0		0.0	10.8	40
8	172	169.chn	4A6	6.5	44	4N	7E+05	2E+06	19.7	0.3	0.2	1.00	0.6	0.02	1.51	0.5	0.02	2.4	6.2	0.4	0.05	9.0	0.01	0.01	39.0	0.01	0.0		0.0	0.0		0.0	10.1	50
8	172	166.chn	4A6	6.5	44	4M	7E+05	2E+06	16.3	0.3	0.1	1.14	0.5	0.02	0.97	0.7	0.02	3.0	4.7	0.4	0.06	7.0	0.01	0.01	18.8	0.01	0.0		0.0	0.0		0.0	8.2	10
8	172	130.chn	4A6	6.5	44	3O	7E+05	2E+06	15.7	0.3	0.1	1.00	0.6	0.02	0.86	0.8	0.02	7.1	2.1	0.4	0.07	7.0	0.02	0.00		0.00	0.1	29.4	0.1	0.0		0.0	7.9	0
8	172	129.chn	4A6	6.5	44	3N	7E+05	2E+06	16.1	0.3	0.1	0.82	0.7	0.02	0.99	0.7	0.02	9.5	1.7	0.5	0.09	8.0	0.02	0.04	7.6	0.01	0.2	17.7	0.1	0.0		0.0	8.2	0
8	172	128.chn	4A6	6.5	44	3M	7E+05	2E+06	16.1	0.3	0.1	0.80	0.7	0.02	0.99	0.6	0.02	4.7	3.1	0.4	0.07	8.0	0.02	0.06	4.5	0.01	0.3	14.6	0.1	0.0		0.0	7.5	0
8	172	118.chn	4A6	6.5	44	3K	7E+05	2E+06	20.3	0.3	0.2	0.92	0.6	0.02	1.20	0.6	0.02	2.4	6.1	0.4	0.05	9.0	0.01	0.03	9.5	0.01	0.3	15.5	0.1	0.0		0.0	9.2	0
8	172	117.chn	4A6	6.5	44	3J	7E+05	2E+06	12.2	0.4	0.1	0.83	0.7	0.02	0.86	0.7	0.02	1.5	8.6	0.4	0.05	8.0	0.01	0.10	2.9	0.01	1.4	2.9	0.1	0.0		0.0	6.5	0
8	172	116.chn	4A6	6.5	44	3I	7E+05	2E+06	12.1	0.4	0.1	0.89	0.6	0.02	0.91	0.7	0.02	1.6	8.1	0.4	0.05	9.0	0.01	0.11	2.5	0.01	3.4	1.2	0.1	0.0		0.0	6.7	0
8	150.1	49.chn	6A6	6.5	44	7E	8E+05	2E+06	21.9	0.3	0.2	0.91	0.7	0.02	1.52	0.5	0.02	2.4	6.1	0.4	0.07	7.8	0.02	0.01	27.6	0.01	0.0		0.0	0.0		0.0	9.8	20
8	150.1	50.chn	6A6	6.5	44	7F	8E+05	2E+06	23.7	0.3	0.2	0.95	0.7	0.02	1.66	0.5	0.02	2.4	6.2	0.5	0.10	6.7	0.02	0.01	43.0	0.01	0.0		0.0	0.0		0.0	10.7	15
8	150.1	51.chn	6A6	6.5	44	7G	8E+05	2E+06	20.9	0.3	0.2	0.85	0.7	0.02	1.65	0.4	0.02	2.3	6.3	0.4	0.06	8.4	0.02	0.01	32.1	0.01	0.0		0.0	0.0		0.0	9.7	25
8	150.1	54.chn	6A6	6.5	44	7FB	8E+05	2E+06	21.8	0.3	0.2	1.02	0.6	0.02	1.55	0.5	0.02	1.7	12.6	0.6	0.07	7.3	0.02	0.00		0.00	0.0		0.0	0.0		0.0	10.2	20
8	150.1	55.chn	6A6	6.5	44	7H	8E+05	2E+06	19.9	0.3	0.2	0.92	0.7	0.02	1.50	0.5	0.02	1.5	13.6	0.6	0.06	8.7	0.02	0.02	12.5	0.01	0.5	8.5	0.1	2.7	5.5	0.5	9.6	50
8	172	56.chn	6A6	6.5	44	7I	8E+05	2E+06	20.5	0.3	0.2	0.96	0.7	0.02	1.64	0.5	0.02	1.8	12.2	0.7	0.06	9.5	0.02	0.08	4.1	0.01	1.2	3.7	0.1	8.8	1.9	0.5	10.3	20
8	139.1N	65.chn	6A6	6.5	44	7M	8E+05	2E+06	19.0	0.3	0.2	0.96	0.6	0.02	1.42	0.5	0.02	1.4	14.5	0.6	0.08	7.1	0.02	0.01	20.3	0.01	0.2	23.3	0.1	0.0		0.0	9.0	40
8	139.1N	66.chn	6A6	6.5	44	7N	8E+05	2E+06	20.5	0.3	0.2	0.98	0.6	0.02	1.47	0.5	0.02	1.7	12.3	0.6	0.06	8.2	0.01	0.01	20.9	0.01	0.3	15.4	0.1	0.0		0.0	9.6	30
8	118.1	67.chn	6A6	6.5	44	7O	8E+05	2E+06	15.3	0.3	0.1	0.88	0.7	0.02	1.23	0.5	0.02	2.0	6.7	0.4	0.08	7.3	0.02	0.03	8.2	0.01	0.2	15.3	0.1	1.3	10.2	0.4	7.9	60
8	150.2	68.chn	6A6	6.5	44	7P	8E+05	2E+06	15.2	0.3	0.1	0.81	0.7	0.02	1.09	0.6	0.02	2.0	6.6	0.4	0.06	8.5	0.01	0.02	14.6	0.01	0.0		0.0	0.0		0.0	7.3	20
8	150.2	71.chn	6A6	6.5	44	7Q	8E+05	2E+06	17.4	0.3	0.2	0.82	0.7	0.02	1.25	0.5	0.02	2.2	6.1	0.4	0.08	7.2	0.02	0.02	11.4	0.01	0.0		0.0	0.0		0.0	8.1	15
8	150.3	74.chn	6A6	6.5	44	7R	8E+05	2E+06	15.7	0.3	0.1	0.83	0.7	0.02	1.14	0.6	0.02	2.0	9.8	0.6	0.10	6.9	0.02	0.24	1.5	0.01	0.8	5.1	0.1	11.4	1.4	0.5	7.9	35
8	150.3	72.chn	6A6	6.5	44	7S	8E+05	2E+06	14.8	0.3	0.1	0.82	0.7	0.02	1.22	0.6	0.02	1.8	10.9	0.6	0.09	7.7	0.02	0.44	0.9	0.01	1.5	3.0	0.1	13.7	1.2	0.5	8.2	10
8	138	73.chn	6A6	6.5	44	7T	8E+05	2E+06	16.8	0.3	0.2	0.86	0.7	0.02	1.36	0.5	0.02	1.8	11.1	0.6	0.09	6.5	0.02	0.02	13.5	0.01	3.0	1.4	0.1	0.0		0.0	8.2	30
8	138	74.chn	6A6	6.5	44	7U	8E+05	2E+06	16.7	0.3	0.2	0.90	0.7	0.02	1.39	0.5	0.02	1.8	10.8	0.6	0.08	7.0	0.02	0.02	16.4	0.01	2.8	1.5	0.1	0.0		0.0	8.5	60
8	123.1	80.chn	6A6	6.5	44	7V	7E+05	2E+06	21.4	0.3	0.2	1.03	0.6	0.02	1.44	0.5	0.02	5.2	4.3	0.7	0.09	6.8	0.02	0.00		0.00	0.1	47.0	0.1	0.0		0.0	9.8	20
8	123.1	81.chn	6A6	6.5	44	7W	7E+05	2E+06	22.1	0.3	0.2	1.05	0.6	0.02	1.56	0.5	0.02	4.2	5.3	0.7	0.08	7.1	0.02	0.01	44.0	0.01	0.0		0.0	0.0		0.0	10.1	0
8	123.1	82.chn	6A6	6.5	44	7X	7E+05	2E+06	22.7	0.3	0.2	1.00	0.6	0.02	1.62	0.5	0.02	5.6	4.1	0.7	0.07	7.6	0.02	0.01	43.0	0.01	0.0		0.0	0.0		0.0	10.4	0
8	123.1	83.chn	6A6	6.5	44	7Y	7E+05	2E+06	22.2	0.3	0.2	0.97	0.7	0.02	1.55	0.5	0.02	4.4	5.1	0.7	0.10	6.3	0.02	0.01	49.0	0.01	0.0		0.0	0.0		0.0	10.1	0
8	150.6	86.chn	6A6	6.5	44	7Z	8E+05	2E+06	18.1	0.3	0.2	0.88	0.7	0.02	1.61	0.5	0.02	2.3	6.4	0.4	0.08	7.5	0.02	0.02	17.1	0.01	0.8	5.1	0.1	0.0		0.0	9.3	30
8	150.6	87.chn	6A6	6.5	44	8A	8E+05	2E+06	21.4	0.3	0.2	1.03	0.6	0.02	1.48	0.5	0.02	2.0	10.5	0.6	0.10	6.3	0.02	0.01	27.6	0.01	2.0	2.1	0.1	0.0		0.0	9.8	35
8	150.6	88.chn	6A6	6.5	44	8B	8E+05	2E+06	22.5	0.3	0.2	1.07	0.6	0.02	1.55	0.5	0.02	2.1	10.2	0.6	0.09	6.8	0.02	0.00		0.00	0.0		0.0	0.0		0.0	10.4	65
8	184	89.chn	6A6	6.5	44	8C	7E+05	2E+06	19.4	0.3	0.2	1.03	0.6	0.02	1.53	0.5	0.02	1.7	11.6	0.6	0.09	6.7	0.02	0.01	44.0	0.01	0.0		0.0	0.0		0.0	[illegible]	40
8	150.8	86.chn	6A6	6.5	44	7Z	8E+05	2E+06	18.1	0.3	0.2	0.88	0.7	0.02	1.61	0.5	0.02	2.3	6.4	0.4	0.08	7.5	0.02	0.02	17.1	0.01	0.8	5.1	0.1	0.0		0.0	9.3	30
8	150.8	87.chn	6A6	6.5	44	8A	8E+05	2E+06	21.4	0.3	0.2	1.03	0.6	0.02	1.48	0.5	0.02	2.0	10.5	0.6	0.10	6.3	0.02	0.01	27.6	0.01	2.0	2.1	0.1	0.0		0.0	9.8	35
8	150.8	88.chn	6A6	6.5	44	8B	8E+05	2E+06	22.5	0.3	0.2	1.07	0.6	0.02	1.55	0.5	0.02	2.1	10.2	0.6	0.09	6.8	0.02	0.00		0.00	0.0		0.0	0.0		0.0	10.4	65
8	150.4	105.chn	6A6	6.5	44	8E	8E+05	2E+06	14.6	0.3	0.1	0.85	0.7	0.02	0.79	0.8	0.02	1.6	8.3	0.4	0.05	8.7	0.01	0.01	48.0	0.01	0.2	20.8	0.1	0.5	40.0	0.5	6.8	30
8	150.7	106.chn	6A6	6.5	44	8F	8E+05	2E+06	19.5	0.3	0.2	1.02	0.6	0.02	1.70	0.5	0.03	1.9	10.8	0.6	0.07	8.1	0.02	0.01	24.5	0.01	1.1	3.4	0.1	6.4	2.5	0.5	10.5	60
8	118.2	106.chn	6A6	6.5	44	8F	8E+05	2E+06	19.5	0.3	0.2	1.02	0.6	0.02	1.70	0.5	0.03	1.9	10.8	0.6	0.07	8.1	0.02	0.01	24.5	0.01	1.1	3.4	0.1	6.4	2.5	0.5	10.5	60

OU	IHSS Number	File Name	Detector Array	Detector Height (m)	FOV m	Station	North feet	East feet	K-40 pCi/g	% Error	MDA pCi/g	Ra-226 pCi/g	% Error	MDA pCi/g	Th-232 pCi/g	% Error	MDA pCi/g	U-238 pCi/g	% Error	MDA pCi/g	U-235 pCi/g	% Error	MDA pCi/g	Cs-137 pCi/g	% Error	MDA pCi/g	Am-241 pCi/g	% Error	MDA pCi/g	Pu-239 nCi/g	% Error	MDA nCi/g	Exposure uR/h	% FOV Blocked
8	150.7	107.chn	6A6	6.5	44	8G	8E+05	2E+06	18.2	0.3	0.2	0.95	0.7	0.02	1.59	0.5	0.02	2.0	10.0	0.6	0.08	7.6	0.02	0.01	21.0	0.01	0.4	8.3	0.1	0.8	19.0	0.4	9.5	60
8	172	161.chn	6A6	6.5	44	9L	8E+05	2E+06	16.0	0.3	0.1	0.89	0.7	0.02	1.45	0.5	0.02	1.8	11.0	0.6	0.08	6.9	0.02	0.07	4.3	0.01	0.0		0.0	0.0		0.0	8.5	0
9		113.chn	6A6	6.5	44	8I	7E+05	2E+06	17.2	0.3	0.2	0.81	0.7	0.02	1.31	0.5	0.02	1.8	10.3	0.6	0.08	7.4	0.02	0.02	17.9	0.01	0.0		0.0	0.0		0.0	8.1	40
9	122	114.chn	6A6	6.5	44	8J	7E+05	2E+06	17.8	0.3	0.2	0.89	0.7	0.02	1.38	0.5	0.02	1.7	11.6	0.6	0.06	8.0	0.02	0.03	10.9	0.01	0.0		0.0	0.0		0.0	8.5	60
9	159	147.chn	6A6	6.5	44	9D	8E+05	2E+06	16.8	0.3	0.2	0.87	0.7	0.02	1.35	0.5	0.02	1.8	11.1	0.6	0.06	8.8	0.02	0.01	19.4	0.01	11.5	0.5	0.2	4.3	3.3	0.4	8.7	70
9	159	150.chn	6A6	6.5	44	9E	8E+05	2E+06	17.3	0.3	0.2	0.87	0.7	0.02	1.45	0.5	0.02	1.6	12.5	0.6	0.08	7.4	0.02	0.01	20.4	0.01	31.1	0.2	0.2	4.2	3.4	0.4	9.0	70
9	132	151.chn	6A6	6.5	44	9F	8E+05	2E+06	14.6	0.3	0.1	0.84	0.7	0.02	1.28	0.5	0.02	1.5	12.5	0.6	0.07	7.6	0.02	0.07	4.2	0.01	1.2	3.5	0.1	1.1	11.5	0.4	7.7	15
9	137	152.chn	6A6	6.5	44	9G	8E+05	2E+06	18.8	0.3	0.2	0.92	0.7	0.02	1.57	0.5	0.02	9.4	2.6	0.7	0.66	1.7	0.03	0.05	6.4	0.01	9.7	0.6	0.2	7.8	2.1	0.5	9.9	20
9	137	155.chn	6A6	6.5	44	9H	8E+05	2E+06	14.1	0.3	0.1	0.71	0.8	0.02	1.23	0.5	0.02	17.3	1.4	0.7	1.78	0.7	0.04	0.10	3.0	0.01	13.5	0.4	0.2	5.8	2.5	0.4	8.6	75
9	137	156.chn	6A6	6.5	44	9I	8E+05	2E+06	14.9	0.3	0.1	0.70	0.8	0.02	1.08	0.6	0.02	9.2	2.5	0.7	1.35	0.9	0.04	0.05	5.8	0.01	9.8	0.6	0.2	3.4	4.2	0.4	8.0	60
9	124	157.chn	6A6	6.5	44	9J	8E+05	2E+06	21.6	0.3	0.2	1.04	0.6	0.02	1.64	0.5	0.02	2.1	10.2	0.6	0.08	7.3	0.02	0.01	20.4	0.01	1.6	2.6	0.1	0.0		0.0	10.4	50
9	124	160.chn	6A6	6.5	44	9K	8E+05	2E+06	20.1	0.3	0.2	0.83	0.7	0.02	1.38	0.5	0.02	2.6	8.0	0.6	0.08	7.6	0.02	0.01	20.7	0.01	3.8	1.1	0.1	0.0		0.0	9.0	20
10	170	56.chn	3A6	6.5	44	G02	8E+05	2E+06	8.2	0.5	0.1	0.78	0.6	0.01	0.95	0.6	0.02	1.7	6.6	0.3	0.06	7.0	0.01	0.33	1.0	0.01	0.0		0.0	0.0		0.0	5.8	0
10	170	55.chn	3A6	6.5	44	G03	8E+05	2E+06	10.3	0.4	0.1	0.58	0.8	0.01	0.77	0.7	0.02	1.4	8.1	0.3	0.05	9.0	0.01	0.11	2.3	0.01	0.0		0.0	0.0		0.0	5.4	25
10	170	64.chn	3A6	6.5	44	H03	8E+05	2E+06	14.7	0.4	0.2	0.65	0.8	0.02	1.07	0.6	0.02	1.7	[illegible]	0.4	0.07	8.0	0.02	0.11	2.4	0.01	0.0		0.0	0.0		0.0	7.0	40
10	170	52.chn	3A6	6.5	44	I03	8E+05	2E+06	15.8	0.3	0.1	0.79	0.7	0.02	1.31	0.5	0.02	2.0	6.3	0.4	0.08	7.0	0.02	0.15	1.9	0.01	0.0		0.0	0.0		0.0	8.0	0
10	170	63.chn	3A6	6.5	44	F04	8E+05	2E+06	10.7	0.4	0.1	0.74	0.7	0.02	0.99	0.6	0.02	1.7	6.6	0.3	0.07	7.0	0.01	0.32	1.0	0.01	0.1	31.7	0.1	0.0		0.0	6.3	0
10	170	67.chn	3A6	6.5	44	F04	8E+05	2E+06	10.9	0.4	0.1	0.77	0.7	0.02	0.99	0.6	0.02	1.8	6.4	0.3	0.07	7.0	0.02	0.31	1.0	0.01	0.0		0.0	0.0		0.0	6.3	0
10	170	62.chn	3A6	6.5	44	G04	8E+05	2E+06	12.4	0.4	0.1	0.86	0.6	0.02	0.93	0.6	0.02	1.4	12.6	0.5	0.04	9.0	0.01	0.11	2.5	0.01	0.0		0.0	0.0		0.0	6.7	30
10	170	61.chn	3A6	6.5	44	H04	8E+05	2E+06	13.4	0.4	0.2	0.78	0.7	0.02	0.90	0.7	0.02	1.7	7.2	0.4	0.04	10.0	0.01	0.03	8.1	0.01	0.0		0.0	0.0		0.0	6.9	50
10	170	51.chn	3A6	6.5	44	I04	8E+05	2E+06	16.9	0.3	0.2	0.81	0.7	0.02	1.22	0.5	0.02	1.9	6.9	0.4	0.08	7.0	0.02	0.04	6.9	0.01	0.0		0.0	0.0		0.0	8.2	0
10	170	15.chn	3A6	6.5	44	F05	8E+05	2E+06	16.9	0.3	0.2	1.05	0.6	0.02	1.16	0.6	0.02	1.7	7.5	0.4	0.05	8.0	0.01	0.10	2.7	0.01	0.0		0.0	0.0		0.0	8.4	0
10	170	48.chn	3A6	6.5	44	G05	8E+05	2E+06	12.1	0.4	0.1	0.68	0.7	0.01	0.92	0.6	0.02	1.8	6.6	0.4	0.07	7.0	0.01	0.09	2.8	0.01	0.0		0.0	0.0		0.0	6.4	10
10	170	49.chn	3A6	6.5	44	H05	8E+05	2E+06	14.6	0.4	0.2	0.80	0.7	0.02	1.04	0.6	0.02	1.9	6.3	0.4	0.08	7.0	0.02	0.05	4.9	0.01	0.0		0.0	0.0		0.0	7.3	0
10	170	50.chn	3A6	6.5	44	I05	8E+05	2E+06	12.8	0.4	0.2	0.75	0.7	0.02	0.99	0.6	0.02	1.6	7.7	0.4	0.06	8.0	0.02	0.07	3.6	0.01	0.0		0.0	0.0		0.0	6.7	30
10	170	57.chn	3A6	6.5	44	E06	8E+05	2E+06	12.0	0.4	0.1	0.80	0.6	0.01	1.00	0.6	0.02	1.8	6.5	0.4	0.06	7.0	0.01	0.28	1.1	0.01	0.0		0.0	0.0		0.0	6.7	0
10	213	16.chn	3A6	6.5	44	F06	8E+05	2E+06	18.0	0.3	0.2	1.09	0.5	0.02	1.14	0.6	0.02	1.6	11.6	0.6	0.06	7.0	0.01	0.11	2.5	0.01	0.0		0.0	0.0		0.0	8.6	0
10	170	2.chn	3A6	6.5	44	G06	8E+05	2E+06	17.4	0.3	0.2	0.98	0.6	0.02	1.12	0.6	0.02	2.0	6.5	0.4	0.06	7.0	0.01	0.08	3.6	0.01	0.0		0.0	0.0		0.0	8.3	0
10	170	38.chn	3A6	6.5	44	H06	8E+05	2E+06	15.0	0.3	0.1	0.69	0.7	0.01	1.14	0.5	0.02	1.8	6.9	0.4	0.07	8.0	0.02	0.09	2.9	0.01	0.0		0.0	0.0		0.0	7.4	0
10	170	8.chn	3A6	6.5	44	E07	8E+05	2E+06	17.7	0.3	0.2	0.96	0.6	0.02	1.08	0.6	0.02	1.9	6.7	0.4	0.05	8.0	0.01	0.09	3.2	0.01	0.0		0.0	0.0		0.0	8.3	0
10	170	17.chn	3A6	6.5	44	F07	8E+05	2E+06	19.1	0.3	0.2	1.04	0.6	0.02	1.21	0.5	0.02	1.9	6.9	0.4	0.07	7.0	0.01	0.12	2.4	0.01	0.0		0.0	0.0		0.0	8.9	0
10	170	3.chn	3A6	6.5	44	G07	8E+05	2E+06	15.3	0.4	0.2	0.93	0.6	0.02	1.14	0.6	0.02	1.9	6.9	0.4	0.08	7.0	0.02	0.12	2.4	0.01	0.0		0.0	0.0		0.0	7.8	0
10	170	37.chn	3A6	6.5	44	H07	8E+05	2E+06	15.5	0.3	0.1	0.79	0.7	0.02	1.40	0.5	0.02	1.7	10.5	0.5	0.07	7.0	0.02	0.20	1.5	0.01	0.0		0.0	0.0		0.0	8.2	0
10	170	58.chn	3A6	6.5	44	D08	8E+05	2E+06	12.4	0.4	0.1	0.78	0.7	0.02	1.08	0.6	0.02	1.6	7.3	0.4	0.06	8.0	0.01	0.20	1.5	0.01	0.0		0.0	0.0		0.0	7.0	0
10	170	9.chn	3A6	6.5	44	E08	8E+05	2E+06	16.9	0.3	0.2	0.97	0.6	0.02	1.16	0.6	0.02	1.7	7.8	0.4	0.06	7.0	0.01	0.09	3.1	0.01	0.0		0.0	0.0		0.0	8.3	0
10	170	19.chn	3A6	6.5	44	F08	8E+05	2E+06	18.4	0.3	0.2	0.83	0.7	0.02	1.15	0.5	0.02	1.9	6.6	0.4	0.07	7.0	0.01	0.11	2.6	0.01	0.0		0.0	0.0		0.0	8.3	0
10	170	4.chn	3A6	6.5	44	G08	8E+05	2E+06	14.1	0.4	0.2	0.91	0.6	0.02	1.32	0.5	0.02	2.2	5.9	0.4	0.08	7.0	0.02	0.33	1.0	0.01	0.0		0.0	0.0		0.0	8.1	0
10	170	21.chn	3A6	6.5	44	D09	8E+05	2E+06	16.1	0.3	0.1	0.92	0.6	0.02	1.86	0.4	0.02	2.4	5.7	0.4	0.10	6.0	0.02	0.18	1.8	0.01	0.0		0.0	0.0		0.0	9.6	0
10	170	10.chn	3A6	6.5	44	E09	8E+05	2E+06	15.1	0.3	0.1	1.10	0.5	0.02	1.78	0.4	0.02	2.6	5.0	0.4	0.07	7.0	0.01	0.19	1.7	0.01	0.0		0.0	0.0		0.0	9.5	0
10	170	5.chn	3A6	6.5	44	F09	8E+05	2E+06	15.8	0.3	0.1	0.87	0.6	0.02	1.49	0.5	0.02	1.9	7.0	0.4	0.08	7.0	0.02	0.22	1.5	0.01	0.0		0.0	0.0		0.0	8.7	0
10	170	36.chn	3A6	6.5	44	G09	8E+05	2E+06	9.1	0.5	0.1	0.78	0.6	0.01	1.11	0.5	0.02	1.9	6.1	0.4	0.07	7.0	0.01	0.53	0.7	0.01	0.0		0.0	0.0		0.0	6.4	0
10	170	42.chn	3A6	6.5	44	C10	8E+05	2E+06	11.8	0.4	0.1	0.79	0.7	0.02	1.06	0.6	0.02	1.9	6.3	0.4	0.06	7.0	0.01	0.11	2.3	0.01	0.0		0.0	0.0		0.0	6.7	0
10	170	22.chn	3A6	6.5	44	D10	8E+05	2E+06	14.9	0.4	0.2	0.97	0.6	0.02	1.97	0.4	0.02	2.6	5.2	0.4	0.08	7.0	0.02	0.21	1.6	0.01	0.0		0.0	0.0		0.0	9.5	0
10	170	11.chn	3A6	6.5	44	E10	8E+05	2E+06	12.8	0.4	0.2	1.07	0.5	0.02	1.73	0.4	0.02	2.2	5.8	0.4	0.08	6.0	0.01	0.26	1.3	0.01	0.0		0.0	0.0		0.0	8.9	0
10	170	34.chn	3A6	6.5	44	F10	8E+05	2E+06	9.6	0.4	0.1	0.89	0.6	0.02	1.28	0.5	0.02	2.1	5.8	0.4	0.08	6.0	0.02	0.43	0.8	0.01	0.1	25.2	0.1	0.0		0.0	7.0	0
10	170	68chn	3A6	6.5	44	F10	8E+05	2E+06	9.7	0.4	0.1	0.85	0.6	0.02	1.29	0.5	0.02	2.1	5.7	0.4	0.07	7.0	0.02	0.44	0.8	0.01	0.0		0.0	0.0		0.0	7.0	0
10	170	28.chn	3A6	6.5	44	C11	8E+05	2E+06	14.9	0.4	0.2	0.96	0.6	0.02	1.69	0.4	0.02	2.3	5.6	0.4	0.07	7.0	0.01	0.17	1.8	0.01	0.0		0.0	0.0		0.0	9.1	0
10	170	23.chn	3A6	6.5	44	D11	8E+05	2E+06	15.7	0.3	0.1	1.13	0.5	0.02	2.03	0.4	0.02	2.7	5.2	0.4	0.10	6.0	0.02	0.18	1.8	0.01	0.0		0.0	0.0		0.0	10.2	0
10	170	12.chn	3A6	6.5	44	E11	8E+05	2E+06	11.5	0.4	0.1	0.97	0.6	0.02	1.43	0.5	0.02	2.0	6.3	0.4	0.08	6.0	0.01	0.20	1.5	0.01	0.0		0.0	0.0		0.0	7.9	0

OU	IHSS	File Name	Detector	Detector	FOV	Station	North	East	K-40	%	MDA	Ra-226	%	MDA	Th-232	%	MDA	U-238	%	MDA	U-235	%	MDA	Cs-137	%	MDA	Am-241	%	MDA	Pu-239	%	MDA	Exposure	% FOV
	Number		Array	Height (m)	m		feet	feet	pCi/g	Error	pCi/g	pCi/g	Error	pCi/g	pCi/g	Error	pCi/g	pCi/g	Error	pCi/g	pCi/g	Error	pCi/g	pCi/g	Error	pCi/g	pCi/g	Error	pCi/g	nCi/g	Error	nCi/g	uR/h	Blocked
10	170	32.chn	3A6	6.5	44	F11	8E+05	2E+06	7.8	0.5	0.1	1.18	0.5	0.02	1.03	0.6	0.02	1.7	7.1	0.4	0.05	7.0	0.01	0.38	0.9	0.01	0.0		0.0	0.0		0.0	6.8	0
10	170	41.chn	3A6	6.5	44	B12	8E+05	2E+06	12.1	0.4	0.1	0.81	0.6	0.01	1.02	0.6	0.02	1.7	7.0	0.4	0.05	8.0	0.01	0.04	5.7	0.01	0.0		0.0	0.0		0.0	6.8	0
10	170	29.chn	3A6	6.5	44	C12	8E+05	2E+06	17.0	0.3	0.2	1.13	0.5	0.02	2.27	0.3	0.02	2.8	4.9	0.4	0.09	6.0	0.02	0.18	1.8	0.01	0.0		0.0	0.0		0.0	10.9	0
10	170	24.chn	3A6	6.5	44	D12	8E+05	2E+06	15.9	0.3	0.1	1.28	0.5	0.02	2.08	0.4	0.02	2.9	4.9	0.4	0.08	6.0	0.02	0.25	1.4	0.01	0.0		0.0	0.0		0.0	10.5	0
10	170	35.chn	3A6	6.5	44	E12	8E+05	2E+06	9.7	0.4	0.1	0.84	0.6	0.02	1.28	0.5	0.02	1.9	6.1	0.4	0.07	7.0	0.02	0.39	0.9	0.01	0.0		0.0	0.0		0.0	6.9	0
10	170	45.chn	3A6	6.5	44	B13	8E+05	2E+06	11.4	0.4	0.1	0.73	0.7	0.02	1.00	0.6	0.02	1.7	6.8	0.3	0.05	8.0	0.01	0.14	2.0	0.01	0.0		0.0	0.0		0.0	6.4	30
10	170	44.chn	3A6	6.5	44	C13	8E+05	2E+06	12.6	0.4	0.2	0.81	0.6	0.01	1.36	0.5	0.02	1.8	6.7	0.4	0.06	8.0	0.01	0.17	1.7	0.01	0.0		0.0	0.0		0.0	7.7	10
10	170	25.chn	3A6	6.5	44	D13	8E+05	2E+06	11.3	0.4	0.1	1.01	0.6	0.02	1.55	0.4	0.02	2.0	6.2	0.4	0.06	7.0	0.01	0.25	1.3	0.01	0.0		0.0	0.0		0.0	8.1	0
10	170	30.chn	4A6	6.5	44	E13	8E+05	2E+06	7.6	0.5	0.1	0.88	0.6	0.02	1.02	0.6	0.02	1.6	7.2	0.3	0.07	7.0	0.01	0.43	0.8	0.01	0.0		0.0	0.0		0.0	6.2	0
10		34.chn	4A6	6.5	44		7E+05	2E+06	16.5	0.7	0.3	0.69	1.8	0.04	1.17	1.2	0.04	10.8	2.9	0.9	0.15	11.0	0.05	0.00		0.00	0.2	36.0	0.2	0.0		0.0	9.3	40
10	170	43.chn	3A6	6.5	44	D14	8E+05	2E+06	6.6	0.5	0.1	0.64	0.7	0.01	0.76	0.7	0.02	1.5	7.1	0.3	0.05	8.0	0.01	0.21	1.3	0.01	0.0		0.0	0.0		0.0	4.8	30
10	182	32.chn	4A6	6.5	44	182	7E+05	2E+06	21.4	0.6	0.4	1.05	1.3	0.04	1.37	1.1	0.05	17.4	2.0	1.0	0.21	8.0	0.05	0.03	23.3	0.02	0.0		0.0	0.0		0.0	11.1	75
10	181	165.chn	4A6	6.5	44	4L	7E+05	2E+06	18.6	0.3	0.2	1.08	0.6	0.02	1.92	0.4	0.02	2.1	6.9	0.4	0.06	8.0	0.01	0.00		0.00	0.0		0.0	0.0		0.0	11.3	60
10	207	33.chn	4A6	6.5	44	207	7E+05	2E+06	18.6	0.6	0.3	1.01	1.2	0.04	1.88	0.8	0.05	3.2	9.3	0.9	0.08	15.0	0.04	0.03	20.6	0.02	2.7	3.2	0.3	0.0		0.0	10.7	50
10	177	111.chn	4A6	6.5	44	3F	7E+05	2E+06	17.3	0.3	0.2	0.73	0.8	0.02	1.01	0.6	0.02	1.7	7.6	0.4	0.06	9.0	0.02	0.04	7.0	0.01	0.0		0.0	0.0		0.0	7.9	0
10	177	110.chn	4A6	6.5	44	3E	7E+05	2E+06	21.0	0.3	0.2	0.91	0.7	0.02	1.36	0.5	0.02	2.1	6.7	0.4	0.09	7.0	0.02	0.03	9.2	0.01	0.0		0.0	0.0		0.0	9.7	20
10	214	28.chn	5A6	6.5	44	6E	7E+05	2E+06	22.1	0.3	0.2	1.07	0.6	0.02	1.65	0.5	0.02	2.6	5.9	0.5	0.07	7.6	0.02	0.01	26.6	0.01	0.2	24.2	0.1	0.0		0.0	10.9	40
10	214	14.chn	6A6	6.5	44	6L	7E+05	2E+06	21.9	0.3	0.2	0.99	0.6	0.02	1.68	0.5	0.03	2.6	5.9	0.5	0.08	7.1	0.02	0.00		0.00	0.2	21.9	0.1	0.0		0.0	10.4	50
10	214	3.chn	6A6	6.5	44	6G	7E+05	2E+06	18.0	0.3	0.2	0.87	0.7	0.02	1.35	0.5	0.02	2.2	6.7	0.4	0.05	9.3	0.01	0.00		0.00	0.0		0.0	0.0		0.0	8.7	50
10	214	4.chn	6A6	6.5	44	6H	7E+05	2E+06	21.7	0.3	0.2	1.01	0.6	0.02	1.60	0.5	0.02	2.4	6.3	0.5	0.08	7.2	0.02	0.00		#VALUE!	0.2	21.8	0.1	0.0		0.0	10.1	20
10	214	26.chn	5A6	6.5	44	6C	8E+05	2E+06	24.4	0.3	0.2	1.16	0.6	0.02	1.69	0.5	0.03	3.1	4.9	0.5	0.09	6.4	0.02	0.02	15.6	0.01	2.6	1.7	0.1	0.0		0.0	11.4	50
10	214	7.chn	6A6	6.5	44	6I	7E+05	2E+06	19.7	0.3	0.2	1.16	0.6	0.02	1.19	0.6	0.02	2.3	6.3	0.4	0.06	7.5	0.01	0.00		0.00	0.0		0.0	0.0		0.0	8.9	5
10	214	27.chn	5A6	6.5	44	6D	7E+05	2E+06	20.8	0.3	0.2	1.07	0.6	0.02	1.49	0.5	0.02	3.1	4.8	0.4	0.10	6.1	0.02	0.02	17.2	0.01	2.7	1.6	0.1	0.0		0.0	10.2	30
10	214	2.chn	6A6	6.5	44	6F	7E+05	2E+06	17.6	0.3	0.2	0.86	0.7	0.02	1.35	0.5	0.02	2.2	6.6	0.4	0.07	8.2	0.02	0.00		0.00	0.2	17.2	0.1	0.0		0.0	8.6	60
10	214	384.chn	4A6	6.5	44	5O	8E+05	2E+06	16.9	0.3	0.2	0.72	0.8	0.02	1.34	0.5	0.02	2.1	6.7	0.4	0.09	6.9	0.02	0.04	7.4	0.01	1.1	3.5	0.1	0.0		0.0	8.3	50
10	214	383.chn	4A6	6.5	44	5N	8E+05	2E+06	13.3	0.4	0.2	0.65	0.8	0.02	0.94	0.6	0.02	2.4	5.4	0.4	0.10	6.3	0.02	0.06	4.6	0.01	4.5	1.0	0.1	0.0		0.0	6.7	30
10	214	8.chn	6A6	6.5	44	6J	7E+05	2E+06	19.8	0.3	0.2	1.26	0.5	0.02	1.26	0.6	0.02	2.6	5.7	0.4	0.07	6.5	0.01	0.01	51.0	0.01	0.2	23.8	0.1	0.0		0.0	9.3	5
10	214	380.chn	4A6	6.5	44	5M	8E+05	2E+06	16.7	0.3	0.2	0.76	0.7	0.02	1.22	0.5	0.02	2.3	5.9	0.4	0.09	6.9	0.02	0.04	7.1	0.01	2.1	2.0	0.1	0.0		0.0	8.0	0
10	214	13.chn	6A6	6.5	44	6K	7E+05	2E+06	19.8	0.3	0.2	1.12	0.6	0.02	1.27	0.5	0.02	2.5	5.8	0.4	0.06	7.5	0.01	0.01	30.1	0.01	0.0		0.0	0.0		0.0	9.1	10
10	214	371.chn	4A6	6.5	44	5H	8E+05	2E+06	17.8	0.3	0.2	0.84	0.7	0.02	1.25	0.5	0.02	2.1	6.6	0.4	0.07	7.4	0.02	0.02	13.3	0.01	1.0	3.7	0.1	0.0		0.0	8.5	20
10	214	376.chn	4A6	6.5	44	5K	8E+05	2E+06	19.2	0.3	0.2	1.05	0.6	0.02	1.40	0.5	0.02	2.6	5.4	0.4	0.05	8.2	0.01	0.03	8.2	0.01	0.6	6.9	0.1	0.0		0.0	9.6	10
10	214	375.chn	4A6	6.5	44	5J	7E+05	2E+06	15.6	0.3	0.1	0.90	0.6	0.02	1.02	0.6	0.02	1.9	7.[illegible]	0.4	0.05	8.5	0.01	0.04	6.9	0.01	0.2	19.4	0.1	0.0		0.0	7.7	15
10	214	379.chn	4A6	6.5	44	5L	8E+05	2E+06	16.3	0.3	0.1	0.79	0.7	0.02	1.45	0.5	0.02	2.5	5.[illegible]	0.4	0.08	7.0	0.02	0.08	3.5	0.01	0.4	10.7	0.1	0.0		0.0	8.4	0
10	214	374.chn	4A6	6.5	44	5I	7E+05	2E+06	14.7	0.4	0.2	0.97	0.6	0.02	1.26	0.5	0.02	2.3	6.0	0.4	0.05	8.1	0.01	0.01	23.7	0.01	0.0		0.0	0.0		0.0	8.1	5
10	175	369.chn	4A6	6.5	44	5F	8E+05	2E+06	18.0	0.3	0.2	0.82	0.7	0.02	1.31	0.5	0.02	2.2	6.2	0.4	0.07	7.8	0.02	0.09	3.3	0.01	0.3	14.3	0.1	0.0		0.0	8.6	20
10	210	370.chn	4A6	6.5	44	5G	8E+05	2E+06	18.3	0.3	0.2	0.86	0.7	0.02	1.30	0.5	0.02	2.1	6.2	0.4	0.07	7.4	0.02	0.02	13.6	0.01	0.1	34.0	0.1	0.0		0.0	8.8	40
10	213	155.chn	4A6	6.5	44	4F	7E+05	2E+06	18.8	0.3	0.2	1.11	5.0	0.17	1.07	0.7	0.02	13.0	1.4	0.5	0.17	5.0	0.03	0.07	4.9	0.01	2.4	1.9	0.1	0.0		0.0	9.5	0
10	213	153.chn	4A6	6.5	44	4D	7E+05	2E+06	17.2	0.3	0.2	1.05	0.6	0.02	1.42	0.5	0.02	2.8	4.9	0.4	0.07	7.0	0.01	0.08	3.4	0.01	1.5	2.8	0.1	0.0		0.0	9.0	0
10	213	154.chn	4A6	6.5	44	4E	7E+05	2E+06	14.4	0.4	0.2	0.83	0.7	0.02	0.78	0.8	0.02	4.6	3.0	0.4	0.09	6.0	0.02	0.10	3.0	0.01	3.5	1.3	0.1	0.0		0.0	6.7	0
10	176	294.chn	4A6	6.5	44	A21	8E+05	2E+06	11.0	0.4	0.1	0.69	0.7	0.01	1.03	0.6	0.02	3.0	4.3	0.4	0.10	6.0	0.02	0.12	2.2	0.01	0.9	4.0	0.1	0.0		0.0	6.5	0
10	176	305.chn	4A6	6.5	44	A22	8E+05	2E+06	9.4	0.4	0.1	0.74	0.7	0.02	0.96	0.6	0.02	4.2	3.0	0.4	0.12	5.0	0.02	0.09	2.9	0.01	2.1	1.9	0.1	0.0		0.0	6.1	40
10	176	306.chn	4A6	6.5	44	A23	8E+05	2E+06	8.2	0.5	0.1	0.70	0.7	0.01	0.80	0.7	0.02	8.6	1.6	0.4	0.17	4.0	0.02	0.09	2.8	0.01	4.3	0.9	0.1	0.6	19.1	0.3	5.7	50
10	176	307.chn	4A6	6.5	44	A24	8E+05	2E+06	10.1	0.4	0.1	0.80	0.7	0.02	0.96	0.7	0.02	27.8	0.7	0.6	0.64	2.0	0.04	0.11	2.9	0.01	18.1	0.3	0.2	0.6	23.6	0.4	8.1	50
10	176	308.chn	4A6	6.5	44	A25	8E+05	2E+06	11.4	0.4	0.1	0.87	0.6	0.02	1.04	0.6	0.02	14.3	1.1	0.5	0.30	3.0	0.03	0.11	2.7	0.01	10.7	0.5	0.2	0.0		0.0	7.7	5
10	176	311.chn	4A6	6.5	44	A26	8E+05	2E+06	11.4	0.4	0.1	0.96	0.6	0.02	1.12	0.6	0.02	7.4	2.0	0.4	0.15	4.0	0.02	0.08	3.5	0.01	8.6	0.5	0.1	0.0		0.0	7.4	0
10	176	312.chn	4A6	6.5	44	A27	8E+05	2E+06	12.7	0.4	0.2	1.08	0.5	0.02	1.07	0.6	0.02	4.1	3.3	0.4	0.09	6.0	0.02	0.05	5.1	0.01	9.1	0.5	0.1	0.0		0.0	7.6	10
10	176	313.chn	4A6	6.5	44	A28	8E+05	2E+06	14.6	0.4	0.2	0.99	0.6	0.02	1.08	0.6	0.02	3.5	4.0	0.4	0.08	6.0	0.01	0.01	22.5	0.01	0.9	4.6	0.1	0.0		0.0	7.7	10
10	213	152.chn	4A6	6.5	44	4C	7E+05	2E+06	18.1	0.3	0.2	0.94	0.7	0.02	1.27	0.6	0.02	5.6	3.1	0.5	0.17	5.0	0.02	0.08	3.9	0.01	49.5	0.2	0.3	0.0		0.0	9.8	0
10	176	295.chn	4A6	6.5	44	B21	8E+05	2E+06	12.8	0.4	0.2	0.72	0.7	0.02	1.19	0.5	0.02	3.4	3.9	0.4	0.09	7.0	0.02	0.07	3.9	0.01	0.7	5.7	0.1	0.0		0.0	7.1	20

OU	IHSS Number	File Name	Detector Array	Detector Height (m)	FOV m	Station	North feet	East feet	K-40 pCi/g	% Error	MDA pCi/g	Ra-226 pCi/g	% Error	MDA pCi/g	Th-232 pCi/g	% Error	MDA pCi/g	U-238 pCi/g	% Error	MDA pCi/g	U-235 pCi/g	% Error	MDA pCi/g	Cs-137 pCi/g	% Error	MDA pCi/g	Am-241 pCi/g	% Error	MDA pCi/g	Pu-239 nCi/g	% Error	MDA nCi/g	Exposure uR/h	% FOV Blocked
10	176	349.chn	4A6	6.5	44	B22	8E+05	2E+06	9.3	0.4	0.1	0.61	0.8	0.01	0.95	0.6	0.02	4.9	2.6	0.4	0.11	5.8	0.02	0.07	3.6	0.01	1.5	2.5	0.1	0.0		0.0	5.7	70
10	176	300.chn	4A6	6.5	44	B23	8E+05	2E+06	10.4	0.4	0.1	0.87	0.6	0.02	1.37	0.5	0.02	14.1	1.1	0.5	0.30	3.0	0.03	0.10	2.8	0.01	6.1	0.7	0.1	0.0		0.0	7.9	50
10	176	321.chn	4A6	6.5	44	B25	8E+05	2E+06	10.0	0.4	0.1	0.79	0.7	0.02	1.03	0.7	0.02	32.5	0.6	0.6	0.74	1.0	0.02	0.09	3.7	0.01	17.4	0.3	0.2	0.0		0.0	8.6	0
10	176	318.chn	4A6	6.5	44	B26	8E+05	2E+06	9.5	0.4	0.1	0.97	0.6	0.02	1.12	0.6	0.02	9.6	1.5	0.4	0.16	4.0	0.02	0.12	2.4	0.01	5.3	0.8	0.1	0.0		0.0	7.2	0
10	176	317.chn	4A6	6.5	44	B27	8E+05	2E+06	9.1	0.5	0.1	0.88	0.6	0.02	1.01	0.6	0.02	4.2	3.1	0.4	0.10	6.0	0.02	0.14	2.0	0.01	2.5	1.6	0.1	0.0		0.0	6.4	0
10	176	314.chn	4A6	6.5	44	B28	8E+05	2E+06	20.0	0.3	0.2	1.05	0.6	0.02	1.17	0.6	0.02	2.8	5.2	0.4	0.07	7.0	0.02	0.02	14.0	0.01	0.7	5.7	0.1	0.0		0.0	9.3	10
10	176	301.chn	4A6	6.5	44	B24	8E+05	2E+06	8.8	0.5	0.1	0.75	0.9	0.02	0.98	0.8	0.02	69.6	0.4	0.8	1.87	1.0	0.06	0.06	6.2	0.01	42.7	0.2	0.3	1.2	16.2	0.6	12.5	40
10	176	296.chn	4A6	6.5	44	C21	8E+05	2E+06	16.1	0.3	0.1	0.82	0.7	0.02	1.25	0.5	0.02	3.1	4.4	0.4	0.09	6.0	0.02	0.03	7.6	0.01	0.5	7.5	0.1	0.0		0.0	8.1	25
10	176	352.chn	4A6	6.5	44	C22	8E+05	2E+06	10.6	0.4	0.1	0.85	0.6	0.02	0.90	0.6	0.02	3.7	3.4	0.4	0.08	6.6	0.01	0.06	4.4	0.01	1.1	3.4	0.1	0.0		0.0	6.4	35
10	176	302.chn	4A6	6.5	44	C23	8E+05	2E+06	14.3	0.4	0.2	1.02	0.6	0.02	1.55	0.5	0.02	8.9	1.7	0.5	0.17	4.0	0.02	0.10	2.9	0.01	2.7	1.6	0.1	0.0		0.0	9.2	40
10	176	330.chn	4A6	6.5	44	C24	8E+05	2E+06	15.2	0.3	0.1	0.80	0.7	0.02	1.28	0.5	0.02	22.7	0.8	0.5	0.53	2.0	0.03	0.06	5.0	0.01	11.8	0.5	0.2	0.0		0.0	9.3	50
10	176	327.chn	4A6	6.5	44	C25	8E+05	2E+06	17.4	0.3	0.2	1.07	0.6	0.02	1.48	0.5	0.02	17.2	1.0	0.5	0.36	2.0	0.02	0.06	5.2	0.01	6.0	0.8	0.1	0.0		0.0	10.2	15
10	176	326.chn	4A6	6.5	44	C26	8E+05	2E+06	17.1	0.3	0.2	1.08	0.6	0.02	1.52	0.5	0.02	7.0	2.1	0.4	0.16	4.0	0.02	0.09	3.3	0.01	2.3	1.8	0.1	0.0		0.0	9.5	5
10	176	325.chn	4A6	6.5	44	C27	8E+05	2E+06	14.0	0.4	0.2	0.97	0.6	0.02	1.24	0.5	0.02	4.3	3.2	0.4	0.08	6.0	0.02	0.18	1.7	0.01	1.8	2.2	0.1	0.0		0.0	8.0	5
10	176	324.chn	4A6	6.5	44	C28	8E+05	2E+06	18.9	0.3	0.2	0.95	0.6	0.02	1.18	0.6	0.02	3.0	4.6	0.4	0.08	7.0	0.02	0.02	12.9	0.01	0.7	5.4	0.1	0.0		0.0	8.8	15
10	213	148.chn	4A6	6.5	44	4A	7E+05	2E+06	16.5	0.3	0.1	0.93	0.6	0.02	1.05	0.6	0.02	4.1	3.7	0.5	0.14	5.0	0.02	0.10	3.0	0.01	31.2	0.2	0.2	0.0		0.0	8.4	0
10	213	147.chn	4A6	6.5	44	3Z	7E+05	2E+06	17.6	0.3	0.2	1.03	0.6	0.02	1.13	0.6	0.02	2.3	6.0	0.4	0.07	7.0	0.01	0.10	2.9	0.01	6.7	0.7	0.1	0.0		0.0	8.5	0
10	213	149.chn	4A6	6.5	44	4B	7E+05	2E+06	17.6	0.3	0.2	1.05	0.6	0.02	1.23	0.6	0.02	7.7	2.1	0.5	0.11	6.0	0.02	0.13	2.6	0.01	8.9	0.6	0.2	0.0		0.0	9.2	0
10	176	297.chn	4A6	6.5	44	D21	8E+05	2E+06	19.5	0.3	0.2	0.85	0.7	0.02	1.24	0.5	0.02	2.7	5.0	0.4	0.08	7.0	0.02	0.02	17.2	0.01	0.3	14.6	0.1	0.0		0.0	8.8	10
10	176	353.chn	4A6	6.5	44	D22	8E+05	2E+06	14.1	0.4	0.2	0.92	0.6	0.02	1.03	0.6	0.02	2.9	4.6	0.4	0.06	7.3	0.01	0.02	12.2	0.01	0.4	10.5	0.1	0.0		0.0	7.4	10
10	176	338.chn	4A6	6.5	44	D23	8E+05	2E+06	16.0	0.3	0.1	0.80	0.7	0.02	1.12	0.6	0.02	3.7	3.7	0.4	0.09	6.0	0.02	0.02	15.0	0.01	0.5	7.5	0.1	0.0		0.0	7.8	50
10	176	337.chn	4A6	6.5	44	D24	8E+05	2E+06	16.1	0.3	0.1	0.87	0.6	0.02	1.29	0.5	0.02	4.0	3.4	0.4	0.10	6.0	0.02	0.04	6.0	0.01	0.9	4.1	0.1	0.0		0.0	8.4	30
10	176	336.chn	4A6	6.5	44	D25	8E+05	2E+06	17.2	0.3	0.2	0.83	0.7	0.02	1.33	0.5	0.02	5.6	2.5	0.4	0.12	5.0	0.02	0.02	13.0	0.01	1.2	3.1	0.1	0.0		0.0	8.5	40
10	176	333.chn	4A6	6.5	44	D26	8E+05	2E+06	18.8	0.3	0.2	0.97	0.6	0.02	1.40	0.5	0.02	4.3	3.3	0.4	0.09	6.0	0.02	0.03	9.8	0.01	0.9	4.6	0.1	0.0		0.0	9.4	50
10	176	332.chn	4A6	6.5	44	D27	8E+05	2E+06	19.7	0.3	0.2	1.02	0.6	0.02	1.45	0.5	0.02	3.5	4.0	0.4	0.08	7.0	0.02	0.06	4.5	0.01	0.7	5.5	0.1	0.0		0.0	9.8	40
10	176	331.chn	4A6	6.5	44	D28	8E+05	2E+06	18.8	0.3	0.2	0.98	0.6	0.02	1.26	0.5	0.02	3.0	4.6	0.4	0.07	7.0	0.01	0.02	14.4	0.01	0.7	5.4	0.1	0.0		0.0	9.0	15
10	176	354.chn	4A6	6.5	44	E22	8E+05	2E+06	18.1	0.3	0.2	0.96	0.6	0.02	1.18	0.6	0.02	2.5	5.5	0.4	0.06	8.0	0.01	0.02	11.7	0.01	0.2	17.7	0.1	0.0		0.0	8.5	5
10	176	348.chn	4A6	6.5	44	E23	8E+05	2E+06	12.2	0.4	0.1	0.70	0.7	0.01	0.93	0.6	0.02	2.3	5.4	0.4	0.07	7.6	0.02	0.07	3.6	0.01	0.5	7.9	0.1	0.0		0.0	6.3	25
10	176	347.chn	4A6	6.5	44	E24	8E+05	2E+06	11.4	0.4	0.1	0.67	0.7	0.01	0.94	0.6	0.02	2.4	5.0	0.4	0.08	7.0	0.02	0.07	3.7	0.01	0.6	5.9	0.1	0.0		0.0	6.2	35
10	176	344.chn	4A6	6.5	44	E25	8E+05	2E+06	11.1	0.4	0.1	0.71	0.7	0.01	0.96	0.6	0.02	2.6	4.7	0.4	0.06	7.5	0.01	0.08	3.1	0.01	0.5	7.4	0.1	0.0		0.0	6.2	30
10	176	343.chn	4A6	6.5	44	E26	8E+05	2E+06	12.5	0.4	0.2	0.78	0.7	0.02	1.03	0.6	0.02	2.5	5.1	0.4	0.05	8.5	0.01	0.06	4.4	0.01	0.4	8.4	0.1	0.0		0.0	6.8	40
10	176	342.chn	4A6	6.5	44	E27	8E+05	2E+06	13.9	0.4	0.2	0.76	0.7	0.02	1.22	0.5	0.02	2.7	4.6	0.4	0.07	7.6	0.01	0.06	4.1	0.01	0.5	7.3	0.1	0.0		0.0	7.3	40
10	176	341.chn	4A6	6.5	44	E28	8E+05	2E+06	18.6	0.3	0.2	0.84	0.7	0.02	1.21	0.5	0.02	2.5	5.2	0.4	0.08	6.7	0.02	0.02	15.2	0.01	0.4	9.4	0.1	0.0		0.0	8.4	15
11	168	258.chn	4A6	6.5	44	I8	7E+05	2E+06	7.5	0.5	0.1	0.83	0.6	0.01	1.09	0.5	0.02	1.7	6.7	0.3	0.07	7.0	0.01	0.47	0.8	0.01	0.0		0.0	0.0		0.0	6.2	0
11	168	257.chn	4A6	6.5	44	K8	7E+05	2E+06	7.7	0.5	0.1	0.83	0.6	0.01	1.15	0.5	0.02	1.8	6.2	0.3	0.07	6.0	0.01	0.53	0.7	0.01	0.0		0.0	0.0		0.0	6.3	0
11	168	256.chn	4A6	6.5	44	M8	7E+05	2E+06	8.3	0.5	0.1	0.86	0.6	0.02	1.28	0.5	0.02	2.0	5.5	0.3	0.08	6.0	0.01	0.56	0.7	0.01	0.0		0.0	0.0		0.0	6.7	0
11	168	255.chn	4A6	6.5	44	O8	7E+05	2E+06	8.4	0.5	0.1	0.85	0.6	0.02	1.31	0.5	0.02	2.0	5.8	0.3	0.10	5.0	0.01	0.57	0.7	0.01	0.0		0.0	0.0		0.0	6.9	0
11	168	252.chn	4A6	6.5	44	Q8	7E+05	2E+06	7.3	0.5	0.1	0.95	0.6	0.02	1.18	0.5	0.02	2.0	5.6	0.3	0.08	6.0	0.01	0.60	0.7	0.01	0.0		0.0	0.0		0.0	6.4	0
11	168	251.chn	4A6	6.5	44	S8	7E+05	2E+06	7.2	0.5	0.1	1.04	0.5	0.02	1.17	0.5	0.02	1.9	6.1	0.3	0.06	6.0	0.01	0.65	0.6	0.01	0.0		0.0	0.0		0.0	6.7	0
11	168	249.chn	4A6	6.5	44	U8	7E+05	2E+06	7.3	0.5	0.1	1.03	0.5	0.02	1.21	0.5	0.02	2.0	5.7	0.3	0.08	6.0	0.01	0.61	0.7	0.01	0.0		0.0	0.0		0.0	6.9	0
11	168	250.chn	4A6	6.5	44	U8	7E+05	2E+06	7.4	0.5	0.1	1.12	0.5	0.02	1.23	0.5	0.02	2.0	5.7	0.3	0.07	6.0	0.01	0.61	0.7	0.01	0.0		0.0	0.0		0.0	6.9	0
11	168	246.chn	4A6	6.5	44	W8	7E+05	2E+06	6.1	0.6	0.1	0.64	0.7	0.01	0.95	0.6	0.02	1.6	6.6	0.3	0.07	7.0	0.01	0.52	0.7	0.01	0.0		0.0	0.0		0.0	5.3	0
11	168	189.chn	4A6	6.5	44	I10	7E+05	2E+06	7.8	0.5	0.1	0.77	0.6	0.01	1.14	0.5	0.02	1.7	6.5	0.3	0.08	6.0	0.01	0.50	0.7	0.01	0.0		0.0	0.0		0.0	6.2	0
11	168	190.chn	4A6	6.5	44	K10	7E+05	2E+06	7.6	0.5	0.1	0.81	0.6	0.01	1.15	0.5	0.02	2.1	5.5	0.3	0.07	6.0	0.01	0.52	0.7	0.01	0.0		0.0	0.0		0.0	6.3	0
11	168	193.chn	4A6	6.5	44	M10	7E+05	2E+06	7.9	0.5	0.1	0.94	0.6	0.02	1.14	0.5	0.02	1.7	6.8	0.3	0.05	7.0	0.01	0.50	0.8	0.01	0.0		0.0	0.0		0.0	6.5	0
11	168	194.chn	4A6	6.5	44	O10	7E+05	2E+06	7.8	0.5	0.1	1.00	0.5	0.02	1.22	0.5	0.02	2.0	5.9	0.4	0.06	7.0	0.01	0.57	0.7	0.01	0.0		0.0	0.0		0.0	6.8	0
11	168	207.chn	4A6	6.5	44	Q10	7E+05	2E+06	6.0	0.6	0.1	0.66	0.7	0.01	0.91	0.6	0.02	1.5	7.5	0.3	0.06	8.0	0.01	0.49	0.8	0.01	0.0		0.0	0.0		0.0	5.4	0
11	168	206.chn	4A6	6.5	44	S10	7E+05	2E+06	7.9	0.5	0.1	0.96	0.6	0.02	1.14	0.6	0.02	1.8	6.6	0.4	0.05	8.0	0.01	0.63	0.7	0.01	0.0		0.0	0.0		0.0	7.4	0
11	168	196.chn	4A6	6.5	44	U10	7E+05	2E+06	7.0	0.5	0.1	0.96	0.6	0.02	1.14	0.5	0.02	1.9	5.9	0.3	0.07	6.0	0.01	0.67	0.6	0.01	0.0		0.0	0.0		0.0	6.4	0

OU	IHSS Number	File Name	Detector Array	Detector Height (m)	FOV m	Station	North feet	East feet	K-40 pCi/g	% Error	MDA pCi/g	Ra-226 pCi/g	% Error	MDA pCi/g	Th-232 pCi/g	% Error	MDA pCi/g	U-238 pCi/g	% Error	MDA pCi/g	U-235 pCi/g	% Error	MDA pCi/g	Cs-137 pCi/g	% Error	MDA pCi/g	Am-241 pCi/g	% Error	MDA pCi/g	Pu-239 nCi/g	% Error	MDA nCi/g	Exposure uR/h	% FOV Blocked
11	168	195.chn	4A6	6.5	44	W10	7E+05	2E+06	6.0	0.6	0.1	0.83	0.6	0.01	0.94	0.6	0.02	1.6	6.9	0.3	0.05	8.0	0.01	0.58	0.7	0.01	0.1	38.0	0.1	0.0		0.0	5.6	0
11	168	223.chn	4A6	6.5	44	W10	7E+05	2E+06	6.5	0.5	0.1	0.79	0.6	0.01	1.03	0.6	0.02	1.7	6.6	0.3	0.08	6.0	0.01	0.65	0.6	0.01	0.0		0.0	0.0		0.0	5.8	0
11	168	220.chn	4A6	6.5	44	I12	7E+05	2E+06	8.0	0.5	0.1	0.99	0.5	0.01	1.15	0.5	0.02	1.7	6.6	0.3	0.06	7.0	0.01	0.50	0.8	0.01	0.0		0.0	0.0		0.0	6.6	0
11	168	219.chn	4A6	6.5	44	K12	7E+05	2E+06	7.1	0.5	0.1	0.96	0.6	0.02	1.12	0.5	0.02	1.9	5.8	0.3	0.07	6.0	0.01	0.53	0.7	0.01	0.0		0.0	0.0		0.0	6.4	0
11	168	218.chn	4A6	6.5	44	M12	7E+05	2E+06	7.4	0.5	0.1	0.96	0.6	0.02	1.16	0.5	0.02	2.0	5.7	0.3	0.07	6.0	0.01	0.56	0.7	0.01	0.0		0.0	0.0		0.0	6.6	0
11	168	217.chn	4A6	6.5	44	O12	7E+05	2E+06	7.4	0.5	0.1	0.94	0.6	0.02	1.23	0.5	0.02	1.9	6.1	0.3	0.06	7.0	0.01	0.59	0.7	0.01	0.1	46.0	0.1	0.0		0.0	6.7	0
11	168	224.chn	4A6	6.5	44	O12	7E+05	2E+06	7.4	0.5	0.1	0.85	0.6	0.02	1.18	0.5	0.02	1.9	5.9	0.3	0.07	6.0	0.01	0.59	0.7	0.01	0.0		0.0	0.0		0.0	6.3	0
11	168	225.chn	4A6	6.5	44	O12	7E+05	2E+06	7.5	0.5	0.1	0.83	0.6	0.01	1.20	0.5	0.02	1.9	5.8	0.3	0.08	6.0	0.01	0.59	0.7	0.01	0.0		0.0	0.0		0.0	6.4	0
11	168	208.chn	4A6	6.5	44	Q12	7E+05	2E+06	6.1	0.6	0.1	0.65	0.8	0.02	0.91	0.6	0.02	1.3	8.1	0.3	0.06	8.0	0.01	0.52	0.7	0.01	0.0		0.0	0.0		0.0	5.5	0
11	168	214.chn	4A6	6.5	44	S12	7E+05	2E+06	7.0	0.5	0.1	0.91	0.6	0.02	1.14	0.5	0.02	1.8	6.2	0.3	0.07	6.0	0.01	0.70	0.6	0.01	0.0		0.0	0.0		0.0	6.4	0
11	168	213.chn	4A6	6.5	44	U12	7E+05	2E+06	6.5	0.5	0.1	0.91	0.6	0.02	1.09	0.5	0.02	1.8	6.1	0.3	0.06	7.0	0.01	0.67	0.6	0.01	0.0		0.0	0.0		0.0	6.2	0
11	168	212.chn	4A6	6.5	44	W12	7E+05	2E+06	6.9	0.5	0.1	0.86	0.6	0.02	1.05	0.6	0.02	1.7	6.4	0.3	0.07	7.0	0.01	0.61	0.7	0.01	0.0		0.0	0.0		0.0	6.1	0
11	168	233.chn	4A6	6.5	44	I14	7E+05	2E+06	6.2	0.6	0.1	0.78	0.7	0.02	0.96	0.6	0.02	1.5	7.4	0.3	0.06	7.0	0.01	0.40	0.9	0.01	0.0		0.0	0.0		0.0	5.5	0
11	168	236.chn	4A6	6.5	44	K14	7E+05	2E+06	7.3	0.5	0.1	0.94	0.6	0.02	1.12	0.5	0.02	2.0	5.8	0.3	0.05	8.0	0.01	0.50	0.8	0.01	0.0		0.0	0.0		0.0	6.3	0
11	168	237.chn	4A6	6.5	44	M14	7E+05	2E+06	7.2	0.5	0.1	1.06	0.5	0.02	1.16	0.5	0.02	2.2	5.3	0.3	0.05	7.0	0.01	0.59	0.7	0.01	0.1	25.6	0.1	0.0		0.0	6.8	0
11	168	242.chn	4A6	6.5	44	M14	7E+05	2E+06	7.5	0.5	0.1	0.74	0.7	0.02	1.21	0.5	0.02	2.2	4.9	0.3	0.07	7.0	0.01	0.63	0.6	0.01	0.0		0.0	0.0		0.0	6.4	0
11	168	238.chn	4A6	6.5	44	O14	7E+05	2E+06	7.2	0.5	0.1	1.08	0.5	0.02	1.11	0.5	0.02	1.9	6.2	0.3	0.04	7.0	0.01	0.55	0.7	0.01	0.0		0.0	0.0		0.0	6.7	0
11	168	239.chn	4A6	6.5	44	Q14	7E+05	2E+06	6.7	0.5	0.1	1.00	0.5	0.01	1.05	0.6	0.02	1.8	6.4	0.3	0.06	6.0	0.01	0.62	0.7	0.01	0.0		0.0	0.0		0.0	6.4	0
11	168	243.chn	4A6	6.5	44	S14	7E+05	2E+06	6.2	0.6	0.1	0.64	0.7	0.01	0.98	0.6	0.02	1.8	6.0	0.3	0.07	7.0	0.02	0.58	0.7	0.01	0.0		0.0	0.0		0.0	5.4	0
11	168	244.chn	4A6	6.5	44	U14	7E+05	2E+06	5.7	0.6	0.1	0.61	0.8	0.01	0.90	0.6	0.02	1.4	7.4	0.3	0.07	7.0	0.01	0.59	0.7	0.01	0.0		0.0	0.0		0.0	5.1	0
11	168	245.chn	4A6	6.5	44	W14	7E+05	2E+06	6.6	0.5	0.1	0.63	0.8	0.02	0.92	0.6	0.02	1.5	7.1	0.3	0.08	6.0	0.01	0.53	0.7	0.01	0.0		0.0	0.0		0.0	5.3	0
11	168	267.chn	4A6	6.5	44	I16	7E+05	2E+06	8.5	0.5	0.1	0.87	0.6	0.02	1.27	0.5	0.02	2.0	5.7	0.3	0.07	6.0	0.01	0.53	0.7	0.01	0.0		0.0	0.0		0.0	6.8	0
11	168	268.chn	4A6	6.5	44	K16	7E+05	2E+06	7.3	0.5	0.1	0.77	0.7	0.02	1.12	0.5	0.02	1.8	6.1	0.3	0.07	7.0	0.02	0.48	0.8	0.01	0.0		0.0	0.0		0.0	6.0	0
11	168	269.chn	4A6	6.5	44	M16	7E+05	2E+06	7.3	0.5	0.1	0.87	0.6	0.02	1.22	0.5	0.02	2.0	5.7	0.3	0.08	6.0	0.02	0.61	0.7	0.01	0.0		0.0	0.0		0.0	6.5	0
11	168	270.chn	4A6	6.5	44	O16	7E+05	2E+06	7.3	0.5	0.1	0.89	0.6	0.02	1.25	0.5	0.02	2.1	5.4	0.3	0.08	6.0	0.01	0.66	0.6	0.01	0.0		0.0	0.0		0.0	6.6	0
11	168	273.chn	4A6	6.5	44	Q16	7E+05	2E+06	8.0	0.5	0.1	0.84	0.6	0.02	1.30	0.6	0.02	2.2	5.1	0.3	0.10	5.0	0.01	0.67	0.6	0.01	0.0		0.0	0.0		0.0	6.9	0
11	168	274.chn	4A6	6.5	44	S16	7E+05	2E+06	7.7	0.5	0.1	0.83	0.6	0.01	1.25	0.5	0.02	2.1	5.3	0.3	0.09	5.0	0.01	0.71	0.6	0.01	0.0		0.0	0.0		0.0	6.7	0
11	168	275.chn	4A6	6.5	44	U16	7E+05	2E+06	6.2	0.6	0.1	0.74	0.7	0.02	1.02	0.6	0.02	1.9	5.8	0.3	0.06	8.0	0.01	0.74	0.6	0.01	0.0		0.0	0.0		0.0	5.7	0
11	168	276.chn	4A6	6.5	44	W16	7E+05	2E+06	6.3	0.5	0.1	0.76	0.6	0.01	1.02	0.6	0.02	1.9	5.6	0.3	0.07	7.0	0.01	0.77	0.6	0.01	0.0		0.0	0.0		0.0	5.8	0
11	168	264.chn	4A6	6.5	44	ORW	8E+05	2E+06	14.7	0.4	0.2	1.21	0.5	0.02	1.76	0.4	0.02	2.4	6.1	0.4	0.07	7.0	0.01	0.27	1.3	0.01	0.0		0.0	0.0		0.0	10.3	0
11	168	201.chn	4A6	6.5	44	E24	7E+05	2E+06	7.3	0.5	0.1	0.86	0.6	0.02	1.13	0.5	0.02	2.0	5.5	0.3	0.08	6.0	0.01	0.51	0.7	0.01	0.0		0.0	0.0		0.0	6.2	0
11	168	227.chn	4A6	6.5	44	H24	7E+05	2E+06	6.9	0.5	0.1	0.76	0.7	0.02	1.07	0.5	0.02	1.8	6.2	0.3	0.07	7.0	0.01	0.59	0.7	0.01	0.0		0.0	0.0		0.0	5.8	0
11	168	202.chn	4A6	6.5	44	K24	7E+05	2E+06	6.7	0.5	0.1	0.73	0.7	0.02	0.96	0.6	0.02	1.7	6.6	0.3	0.06	7.0	0.01	0.49	0.8	0.01	0.0		0.0	0.0		0.0	5.5	0
11	168	205.chn	4A6	6.5	44	N24	7E+05	2E+06	6.3	0.6	0.1	0.81	0.6	0.01	0.97	0.6	0.02	1.4	7.8	0.3	0.06	7.0	0.01	0.57	0.7	0.01	0.0		0.0	0.0		0.0	5.9	0
11	168	228.chn	4A6	6.5	44	J25	7E+05	2E+06	7.2	0.5	0.1	0.78	0.6	0.01	1.14	0.5	0.02	1.7	6.3	0.3	0.08	6.0	0.02	0.64	0.6	0.01	0.0		0.0	0.0		0.0	6.2	0
11	168	230.chn	4A6	6.5	44	M25	7E+05	2E+06	6.3	0.6	0.1	0.77	0.7	0.02	1.01	0.6	0.02	1.6	7.1	0.3	0.06	7.0	0.01	0.65	0.6	0.01	0.0		0.0	0.0		0.0	5.8	0
11	168	283.chn	4A6	6.5	44	H26	7E+05	2E+06	7.9	0.5	0.1	0.87	0.6	0.02	1.23	0.5	0.02	1.8	6.2	0.3	0.08	6.0	0.01	0.66	0.6	0.01	0.0		0.0	0.0		0.0	6.7	0
11	168	200.chn	4A6	6.5	44	F27	7E+05	2E+06	6.2	0.6	0.1	0.78	0.6	0.01	0.91	0.6	0.02	1.4	7.7	0.3	0.05	8.0	0.01	0.45	0.8	0.01	0.0		0.0	0.0		0.0	5.4	0
11	168	262.chn	4A6	6.5	44	K27	7E+05	2E+06	7.3	0.5	0.1	1.02	0.5	0.02	1.26	0.5	0.02	2.1	5.6	0.3	0.08	6.0	0.01	0.67	0.6	0.01	0.0		0.0	0.0		0.0	6.8	0
11	168	290.chn	4A6	6.5	44	M27	7E+05	2E+06	6.4	0.5	0.1	1.40	0.4	0.02	1.14	0.5	0.02	1.6	7.1	0.3	0.02	8.0	0.00	0.70	0.6	0.01	0.0		0.0	0.0		0.0	7.3	0
11	168	282.chn	4A6	6.5	44	H28	7E+05	2E+06	8.1	0.5	0.1	0.89	0.6	0.02	1.30	0.5	0.02	2.2	5.3	0.3	0.08	6.0	0.01	0.66	0.6	0.01	0.0		0.0	0.0		0.0	7.0	0
11	168	279.chn	4A6	6.5	44	J28	7E+05	2E+06	7.3	0.5	0.1	0.86	0.6	0.02	1.20	0.5	0.02	2.0	5.6	0.3	0.08	6.0	0.02	0.69	0.6	0.01	0.0		0.0	0.0		0.0	6.6	0
11	168	263.chn	4A6	6.5	44	K29	7E+05	2E+06	7.2	0.5	0.1	1.01	0.5	0.02	1.23	0.5	0.02	2.0	5.7	0.3	0.07	6.0	0.01	0.68	0.6	0.01	0.0		0.0	0.0		0.0	6.8	0
11	168	291.chn	4A6	6.5	44	M29	7E+05	2E+06	6.4	0.5	0.1	1.27	0.5	0.02	1.13	0.5	0.02	1.7	6.6	0.3	0.03	8.0	0.01	0.62	0.7	0.01	0.0		0.0	0.0		0.0	6.9	0
11	168	199.chn	4A6	6.5	44	F30	7E+05	2E+06	7.1	0.5	0.1	0.96	0.5	0.01	1.11	0.5	0.02	1.9	6.0	0.3	0.06	6.0	0.01	0.52	0.7	0.01	0.0		0.0	0.0		0.0	6.4	0
11	168	281.chn	4A6	6.5	44	H30	7E+05	2E+06	7.1	0.5	0.1	0.86	0.6	0.02	1.20	0.5	0.02	1.8	6.0	0.3	0.09	6.0	0.02	0.67	0.6	0.01	0.0		0.0	0.0		0.0	6.4	0
11	168	280.chn	4A6	6.5	44	J30	7E+05	2E+06	7.0	0.5	0.1	0.81	0.6	0.01	1.15	0.5	0.02	2.0	5.7	0.3	0.07	6.0	0.01	0.71	0.6	0.01	0.0		0.0	0.0		0.0	6.3	0
11	168	187.chn	6A6	6.5	44	6W	7E+05	2E+06	6.5	0.5	0.1	0.84	0.6	0.02	1.13	0.5	0.02	2.1	5.1	0.3	0.09	5.4	0.02	0.66	0.6	0.01	0.0		0.0	0.0		0.0	5.9	0
11	168	188.chn	6A6	6.5	44	6U	7E+05	2E+06	6.7	0.5	0.1	0.89	0.6	0.02	1.17	0.5	0.02	1.5	10.2	0.4	0.63	0.7	0.01	0.00		0.00	0.0		0.0	0.0		0.0	6.0	0

OU	IHSS Number	File Name	Detector Array	Detector Height (m)	FOV m	Station	North feet	East feet	K-40 pCi/g	% Error	MDA pCi/g	Ra-226 pCi/g	% Error	MDA pCi/g	Th-232 pCi/g	% Error	MDA pCi/g	U-238 pCi/g	% Error	MDA pCi/g	U-235 pCi/g	% Error	MDA pCi/g	Cs-137 pCi/g	% Error	MDA pCi/g	Am-241 pCi/g	% Error	MDA pCi/g	Pu-239 nCi/g	% Error	MDA nCi/g	Exposure uR/h	% FOV Blocked
11	168	189.chn	6A6	6.5	44	6S	7E+05	2E+06	7.0	0.5	0.1	0.93	0.6	0.02	1.25	0.5	0.02	1.6	9.9	0.5	0.08	5.8	0.01	0.60	0.7	0.01	0.0		0.0	0.0		0.0	6.2	0
11	168	190.chn	6A6	6.5	44	6Q	7E+05	2E+06	6.8	0.5	0.1	0.96	0.6	0.02	1.21	0.5	0.02	1.5	9.9	0.5	0.08	5.8	0.01	0.62	0.7	0.01	0.0		0.0	0.0		0.0	6.2	0
11	168	193.chn	6A6	6.5	44	6O	7E+05	2E+06	7.4	0.5	0.1	0.91	0.6	0.02	1.26	0.5	0.02	1.6	9.9	0.5	0.08	5.7	0.01	0.54	0.7	0.01	0.0			0.0			6.4	0
12		71.chn	3A6	6.5	44	A	7E+05	2E+06	19.0	0.6	0.3	0.85	1.4	0.04	1.48	1.0	0.04	2.5	10.8	0.8	0.06	17.0	0.03	0.01	48.0	0.02	0.0		0.0	0.0		0.0	9.9	50
12		72.chn	3A6	6.5	44	A	7E+05	2E+06	19.1	0.6	0.3	0.88	1.3	0.03	1.48	1.0	0.04	2.4	12.5	0.9	0.08	15.0	0.04	0.00		0.00	0.0		0.0	0.0		0.0	9.5	30
12	136.1	20.chn	4A6	6.5	44	I	7E+05	2E+06	24.1	0.6	0.4	1.18	1.2	0.04	2.26	0.8	0.05	8.3	4.1	1.0	0.15	11.0	0.05	0.00		0.00	0.0		0.0	0.0		0.0	13.4	30
12		19.chn	4A6	6.5	44	O	7E+05	2E+06	23.4	0.6	0.4	1.05	1.2	0.04	1.95	0.8	0.05	4.3	8.0	1.0	0.11	12.0	0.04	0.00		0.00	0.0		0.0	0.0		0.0	12.1	15
12		24.chn	4A6	6.5	44	E	7E+05	2E+06	21.3	0.6	0.4	1.21	1.1	0.04	1.84	0.9	0.05	3.9	7.8	0.9	0.10	13.0	0.04	0.00		0.00	0.0		0.0	0.0		0.0	11.9	50
12	116.1	23.chn	4A6	6.5	44	G	7E+05	2E+06	23.1	0.6	0.4	1.22	1.2	0.04	2.35	0.8	0.06	10.4	3.4	1.1	0.09	14.0	0.04	0.00		0.00	0.0		0.0	0.0		0.0	13.4	30
12		73.chn	3A6	6.5	44	B	7E+05	2E+06	18.8	0.6	0.3	0.99	1.2	0.04	1.23	1.1	0.04	2.5	11.2	0.8	0.09	13.0	0.04	0.05	10.5	0.02	0.0		0.0	0.0		0.0	9.3	30
12		18.chn	4A6	6.5	44	P	7E+05	2E+06	23.0	0.6	0.4	0.96	1.3	0.04	1.73	0.9	0.05	5.3	5.8	0.9	0.07	16.0	0.04	0.00		0.00	0.0		0.0	0.0		0.0	11.2	25
12		17.chn	4A6	6.5	44	K	7E+05	2E+06	19.0	0.6	0.3	0.99	1.2	0.04	1.96	0.8	0.05	3.5	8.1	0.9	0.06	16.0	0.03	0.00		0.00	0.7	10.8	0.2	0.0		0.0	10.8	30
12		12.chn	4A6	6.5	44	M	7E+05	2E+06	16.5	0.7	0.3	0.78	1.5	0.04	1.42	1.0	0.04	2.1	14.5	0.9	0.05	20.0	0.03	0.02	32.2	0.02	2.1	4.3	0.3	0.0		0.0	8.7	0
12		74.chn	3A6	6.5	44	C	7E+05	2E+06	23.4	0.6	0.4	1.15	1.2	0.04	1.98	0.8	0.05	3.3	9.5	0.9	0.09	13.0	0.04	0.01	42.0	0.02	0.0		0.0	0.0		0.0	12.2	10
12		14.chn	4A6	6.5	44	Q	7E+05	2E+06	14.4	0.7	0.3	0.67	1.6	0.03	1.02	1.2	0.04	2.6	10.5	0.8	0.05	19.0	0.03	0.00		0.00	3.7	2.1	0.2	0.0		0.0	7.1	0
12		16.chn	4A6	6.5	44	S	7E+05	2E+06	13.7	0.7	0.3	0.59	1.7	0.03	0.91	1.3	0.04	1.7	14.1	0.7	0.04	23.0	0.03	0.00		0.00	2.7	2.8	0.2	0.0		0.0	6.6	50
12	116.2	11.chn	4A6	6.5	44	L	7E+05	2E+06	17.5	0.7	0.4	0.86	1.4	0.04	1.67	0.9	0.05	2.6	12.6	1.0	0.09	15.0	0.04	0.02	26.2	0.02	1.0	8.8	0.3	0.0		0.0	9.7	0
12		8.chn	4A6	6.5	44	J	7E+05	2E+06	21.0	0.6	0.4	1.08	1.2	0.04	2.17	0.8	0.05	3.5	9.8	1.0	0.08	15.0	0.03	0.00		0.00	1.7	5.3	0.3	0.0		0.0	12.0	40
12		5.chn	4A6	6.5	44	D	7E+05	2E+06	18.7	0.6	0.3	0.78	1.5	0.04	1.25	1.1	0.04	2.2	13.7	0.9	0.07	16.0	0.03	0.02	28.0	0.02	0.6	13.1	0.2	0.0		0.0	8.8	0
12		75.chn	3A6	6.5	44	D	7E+05	2E+06	22.4	0.6	0.4	1.03	1.2	0.04	1.71	0.9	0.05	2.5	11.9	0.9	0.09	13.0	0.04	0.02	25.3	0.02	1.0	8.4	0.2	0.0		0.0	11.2	0
12		13.chn	4A6	6.5	44	R	7E+05	2E+06	16.0	0.7	0.3	0.67	1.7	0.03	0.99	1.3	0.04	2.0	19.8	1.2	0.06	19.0	0.03	0.03	18.9	0.02	23.2	0.6	0.4	0.0		0.0	7.6	0
12		15.chn	4A6	6.5	44	R	7E+05	2E+06	16.1	0.7	0.3	0.74	1.5	0.03	1.05	1.2	0.04	2.4	12.2	0.9	0.08	14.0	0.03	0.03	18.3	0.02	26.2	0.5	0.4	0.0		0.0	7.8	0
12		7.chn	4A6	6.5	44	H	7E+05	2E+06	17.8	0.6	0.3	0.87	1.4	0.04	1.66	0.9	0.04	3.1	9.4	0.9	0.09	14.0	0.04	0.04	15.1	0.02	4.0	2.2	0.3	1.2	23.2	0.8	9.8	40
12	136.2	6.chn	4A6	6.5	44	F	7E+05	2E+06	20.7	0.6	0.4	0.92	1.3	0.04	1.77	0.9	0.05	2.4	12.2	0.9	0.11	13.0	0.04	0.04	14.6	0.02	1.2	6.8	0.2	0.0		0.0	10.8	15
12	120.2	26.chn	4A6	6.5	44	U	7E+05	2E+06	22.2	0.6	0.4	1.21	1.1	0.04	2.06	0.8	0.05	3.0	10.7	1.0	0.09	13.0	0.04	0.02	33.1	0.02	44.5	0.4	0.5	1.3	32.3	1.3	12.6	40
12	136.2	25.chn	4A6	6.5	44	T	7E+05	2E+06	17.4	0.3	0.2	0.86	0.7	0.02	0.98	0.6	0.02	2.3	6.0	0.4	0.08	7.0	0.02	0.04	7.2	0.01	9.6	0.5	0.1	0.9	13.3	0.4	7.9	10
12		1.chn	40447	1	12.4	T (H)	7E+05	2E+06	14.5	0.8	0.3	0.74	1.5	0.03	0.81	1.3	0.03	2.5	11.1	0.8	0.03	17.0	0.01	0.07	8.6	0.02	1.2	1.9	0.1	0.0		0.0	6.9	0
12	120.1	27.chn	4A6	6.5	44	V	7E+05	2E+06	13.6	0.7	0.3	0.88	1.3	0.03	1.02	1.2	0.04	3.6	7.9	0.9	0.13	10.0	0.04	0.10	5.7	0.02	80.1	0.2	0.5	4.8	5.5	0.8	9.4	0
12	120.1	28.chn	4A6	6.5	44	N	7E+05	2E+06	46.8	0.4	0.6	1.92	1.2	0.07	3.10	0.9	0.08	87.7	1.2	3.2	1.71	3.0	0.15	0.76	1.8	0.04	7990.0	0.1	12.0	403.0	0.3	3.6	142.0	50
12	120.1	31.chn	4A6	6.5	44	N	7E+05	2E+06	42.1	0.4	0.5	1.76	1.2	0.06	2.85	0.9	0.08	84.4	1.2	3.0	1.56	3.0	0.14	0.61	2.1	0.04	6990.0	0.1	10.5	356.0	0.3	3.2	116.0	0
12	147.2	109.chn	4A6	6.5	44	3D	7E+05	2E+06	11.0	0.4	0.1	0.66	1.1	0.02	1.03	0.8	0.02	19.3	1.1	0.6	0.17	6.0	0.03	0.05	8.6	0.01	0.0		0.0	0.0		0.0	9.5	30
13	148	106.chn	4A6	6.5	44	3C	7E+05	2E+06	17.6	0.6	0.3	0.95	1.2	0.03	1.10	1.2	0.04	1.9	13.9	0.8	0.09	13.0	0.03	0.03	20.2	0.02	0.0		0.2	0.0		1.2	8.2	0
13	148	103.chn	4A6	6.5	44	ZZ	7E+05	2E+06	18.8	0.6	0.3	0.94	1.3	0.04	1.52	0.9	0.04	2.2	12.4	0.8	0.09	13.0	0.03	0.04	12.7	0.02	0.0		0.2	0.0		1.2	9.6	50
13	148	105.chn	4A6	6.5	44	3B	7E+05	2E+06	17.5	0.6	0.3	0.81	1.4	0.03	1.01	1.3	0.04	1.7	15.5	0.8	0.08	14.0	0.03	0.01	39.0	0.02	0.0		0.2	0.0		1.2	7.9	40
13	148	104.chn	4A6	6.5	44	3A	7E+05	2E+06	17.6	0.6	0.3	1.03	1.2	0.04	1.11	1.2	0.04	1.9	13.8	0.8	0.08	13.0	0.03	0.03	21.3	0.02	0.0		0.2	0.0		1.2	8.7	50
13	128	70.chn	4A6	6.5	44	BB	7E+05	2E+06	19.5	0.6	0.4	0.92	1.3	0.04	1.20	1.1	0.04	1.8	21.4	1.1	0.08	13.0	0.03	0.01	47.0	0.02	0.0		0.2	0.0		1.2	8.8	15
13	171	69.chn	4A6	6.5	44	AA	7E+05	2E+06	17.2	0.6	0.3	0.85	1.3	0.03	0.95	1.3	0.04	1.8	14.3	0.8	0.08	13.0	0.03	0.02	24.7	0.01	0.0		0.2	0.0		1.2	7.6	40
13	171	67.chn	4A6	6.5	44	Y	7E+05	2E+06	20.4	0.6	0.4	1.00	1.2	0.04	0.97	1.3	0.04	2.1	12.7	0.8	0.05	16.0	0.03	0.01	43.0	0.02	0.0		0.2	0.0		1.2	8.5	10
13	134	66.chn	4A6	6.5	44	X	7E+05	2E+06	20.2	0.6	0.4	1.16	1.1	0.04	1.23	1.1	0.04	2.3	12.1	0.8	0.09	12.0	0.03	0.03	17.9	0.02	0.0		0.2	0.0		1.2	9.5	10
13	128	68.chn	4A6	6.5	44	Z	7E+05	2E+06	21.8	0.6	0.4	1.02	1.2	0.04	1.36	1.0	0.04	2.6	13.0	1.0	0.08	14.0	0.03	0.00		0.02	0.0		0.2	0.0		1.2	9.8	5
13	191	77.chn	4A6	6.5	44	FF	7E+05	2E+06	22.2	0.6	0.4	0.98	1.2	0.04	1.47	1.0	0.04	2.1	13.5	0.9	0.10	13.0	0.04	0.02	30.1	0.02	0.0		0.2	0.0		1.2	10.4	50
13	157.1	74.chn	4A6	6.5	44	CC	7E+05	2E+06	20.1	0.6	0.4	0.92	1.3	0.04	1.46	1.0	0.04	2.3	11.7	0.8	0.07	15.0	0.03	0.01	41.0	0.02	0.0		0.2	0.0		1.2	9.6	50
13	157.1	76.chn	4A6	6.5	44	EE	7E+05	2E+06	16.7	0.7	0.4	0.74	1.5	0.03	1.39	1.0	0.04	2.5	12.6	0.9	0.08	15.0	0.03	0.01	40.0	0.02	0.0		0.2	0.0		1.2	8.3	40
13	157.1	75.chn	4A6	6.5	44	DD	7E+05	2E+06	17.7	0.6	0.3	0.75	1.5	0.03	1.23	1.1	0.04	2.7	11.7	0.9	0.07	16.0	0.03	0.02	34.0	0.02	0.0		0.2	0.0		1.2	8.2	40
13	157.1	78.chn	4A6	6.5	44	GG	7E+05	2E+06	22.2	0.6	0.4	0.86	1.4	0.04	1.54	0.9	0.04	2.5	11.6	0.9	0.10	13.0	0.04	0.00		0.02	0.0		0.2	0.0		1.2	10.3	0
13	186	48.chn	4A6	6.5	44	J	8E+05	2E+06	19.1	0.6	0.3	0.95	1.2	0.03	1.05	1.2	0.04	2.2	12.1	0.8	0.04	18.0	0.02	0.00		0.02	0.0		0.2	0.0		1.2	8.3	10
13		102.chn	4A6	6.5	44	YY	7E+05	2E+06	23.4	0.6	0.4	0.97	1.3	0.04	1.63	0.9	0.04	2.4	12.1	0.9	0.07	15.0	0.03	0.00		0.02	0.0		0.2	0.0		1.2	10.9	50
13	157.1	79.chn	4A6	6.5	44	HH	7E+05	2E+06	20.2	0.6	0.4	0.83	1.4	0.03	1.22	1.1	0.04	2.0	13.9	0.8	0.09	13.0	0.04	0.02	22.3	0.02	0.0		0.2	0.0		1.2	9.1	15
13	158	71.chn	4A6	6.5	44	V	7E+05	2E+06	16.2	0.7	0.3	0.71	1.5	0.03	1.01	1.2	0.04	1.8	13.8	0.8	0.07	16.0	0.03	0.04	13.4	0.02	0.0		0.2	0.0		1.2	7.5	50

OU	IHSS Number	File Name	Detector Array	Detector Height (m)	FOV m	Station	North feet	East feet	K-40 pCi/g	% Error	MDA pCi/g	Ra-226 pCi/g	% Error	MDA pCi/g	Th-232 pCi/g	% Error	MDA pCi/g	U-238 pCi/g	% Error	MDA pCi/g	U-235 pCi/g	% Error	MDA pCi/g	Cs-137 pCi/g	% Error	MDA pCi/g	Am-241 pCi/g	% Error	MDA pCi/g	Pu-239 nCi/g	% Error	MDA nCi/g	Exposure uR/h	% FOV Blocked
13	186	47.chn	4A6	6.5	44	I	8E+05	2E+06	16.6	0.7	0.3	0.83	1.3	0.03	1.04	1.2	0.04	2.0	12.7	0.8	0.09	13.0	0.04	0.00		0.02	0.2	45.0	0.2	0.0		1.2	7.7	70
13	152	287.chn	4A6	6.5	44	5B	7E+05	2E+06	19.7	0.3	0.2	0.77	0.7	0.02	1.12	0.6	0.02	1.8	7.5	0.4	0.05	9.0	0.01	0.04	7.2	0.01	0.2	15.3	0.1	0.0		1.2	8.4	0
13	158	64.chn	4A6	6.5	44	U	7E+05	2E+06	15.4	0.7	0.3	1.02	1.1	0.03	1.11	1.2	0.04	2.0	13.1	0.8	0.04	18.0	0.02	0.03	17.3	0.02	0.0		0.2	0.0		1.2	7.9	30
13	117.3	49.chn	4A6	6.5	44	K	7E+05	2E+06	13.8	0.7	0.3	0.82	1.3	0.03	1.18	1.1	0.04	2.7	11.4	0.9	0.09	13.0	0.03	0.07	7.0	0.02	0.3	23.7	0.2	0.0		1.2	7.5	5
13	117.1	33.chn	6A6	6.5	44	6W	8E+05	2E+06	20.5	0.3	0.2	0.80	0.7	0.02	1.25	0.5	0.02	2.2	6.3	0.4	0.08	7.4	0.02	0.09	31.6	0.08	0.0		0.2	0.0		0.4	8.7	0
13	152	286.chn	4A6	6.5	44	5A	7E+05	2E+06	14.0	0.4	0.2	0.71	0.7	0.01	0.98	0.6	0.02	1.8	6.8	0.4	0.07	8.0	0.02	0.06	4.4	0.01	0.3	11.0	0.1	0.0		0.4	6.8	0
13	117.3	51.chn	4A6	6.5	44	N	7E+05	2E+06	13.7	0.7	0.3	0.70	1.4	0.03	0.99	1.2	0.04	2.2	11.3	0.7	0.04	19.0	0.03	0.06	9.0	0.02	0.2	29.0	0.2	0.0		1.2	6.9	0
13	158	63.chn	4A6	6.5	44	T	7E+05	2E+06	20.1	0.6	0.4	1.12	1.1	0.04	1.31	1.1	0.04	2.3	13.0	0.9	0.03	18.0	0.02	0.00		0.02	0.5	15.0	0.2	0.0		1.2	9.6	0
13	158	62.chn	4A6	6.5	44	S	7E+05	2E+06	20.9	0.6	0.4	0.99	1.2	0.04	1.23	1.1	0.04	1.9	14.7	0.8	0.07	15.0	0.03	0.00		0.02	0.3	23.5	0.2	0.0		1.2	9.6	0
13	117.2	58.chn	4A6	6.5	44	R	7E+05	2E+06	21.7	0.6	0.4	0.91	1.3	0.04	1.27	1.1	0.04	1.9	14.5	0.8	0.05	19.0	0.03	0.02	26.4	0.02	0.8	9.2	0.2	0.0		1.2	9.5	0
13	117.1	38.chn	4A6	6.5	44	C	8E+05	2E+06	16.2	0.7	0.3	0.82	1.4	0.03	1.50	0.9	0.04	2.8	9.4	0.8	0.09	13.0	0.04	0.03	20.6	0.02	0.5	13.7	0.2	0.0		1.2	8.5	25
13	117.2	65.chn	4A6	6.5	44	W	7E+05	2E+06	20.6	0.6	0.4	1.10	1.1	0.04	1.51	1.0	0.05	2.3	13.2	0.9	0.08	13.0	0.03	0.01	46.0	0.02	0.9	8.9	0.2	0.0		1.2	10.2	20
13	117.3	50.chn	4A6	6.5	44	L	7E+05	2E+06	15.7	0.7	0.3	0.82	1.3	0.03	1.11	1.1	0.04	2.2	11.5	0.8	0.08	14.0	0.03	0.03	17.4	0.02	0.6	13.1	0.2	0.0		1.2	7.8	0
13	117.1	39.chn	4A6	6.5	44	A	8E+05	2E+06	16.3	0.7	0.3	0.81	1.4	0.03	1.39	1.0	0.04	2.2	12.1	0.8	0.08	13.0	0.03	0.02	25.6	0.02	1.2	6.7	0.2	0.0		1.2	8.4	25
13	117.1	37.chn	4A6	6.5	44	D	8E+05	2E+06	11.7	0.8	0.3	0.67	1.5	0.03	0.94	1.3	0.04	2.1	12.9	0.8	0.07	15.0	0.03	0.02	21.1	0.01	2.0	3.9	0.2	0.0		1.2	6.4	10
13	117.1	44.chn	4A6	6.5	44	H	7E+05	2E+06	17.0	0.7	0.4	1.04	1.2	0.04	1.60	0.9	0.04	2.5	10.7	0.8	0.08	13.0	0.03	0.02	34.0	0.02	3.6	2.4	0.3	0.0		1.2	9.4	25
13	117.3	52.chn	4A6	6.5	44	M	7E+05	2E+06	18.8	0.6	0.3	0.74	1.5	0.03	1.12	1.2	0.04	2.4	11.1	0.8	0.06	18.0	0.03	0.04	13.7	0.02	0.8	10.1	0.2	0.0		1.2	8.3	0
13	117.2	57.chn	4A6	6.5	44	Q	7E+05	2E+06	18.5	0.6	0.3	1.00	1.2	0.04	1.74	0.8	0.04	2.4	11.5	0.8	0.10	12.0	0.03	0.02	22.9	0.02	6.3	1.5	0.3	0.0		1.2	10.0	0
13	117.2	56.chn	4A6	6.5	44	P	7E+05	2E+06	19.8	0.6	0.4	0.88	1.3	0.03	1.40	1.0	0.04	2.4	12.5	0.9	0.06	17.0	0.03	0.02	38.0	0.02	3.6	2.4	0.3	0.0		1.2	9.4	0
13	117.2	55.chn	4A6	6.5	44	O	7E+05	2E+06	21.8	0.6	0.4	0.93	1.3	0.04	1.44	1.0	0.04	2.8	12.0	1.0	0.06	17.0	0.03	0.02	24.5	0.02	1.7	4.9	0.2	0.0		1.2	10.0	0
13	117.1	32.chn	6A6	6.5	44	6V	8E+05	2E+06	22.2	0.3	0.2	1.07	0.6	0.02	1.46	0.5	0.02	2.3	6.2	0.4	0.09	6.3	0.02	0.01	22.2	0.01	0.0		0.1	0.0		0.4	9.9	20
13		82.chn	4A6	6.5	44	II	7E+05	2E+06	18.8	0.7	0.4	0.90	1.3	0.04	1.15	1.2	0.04	2.1	16.7	1.1	0.06	17.0	0.03	0.02	29.3	0.02	0.5	15.5	0.2	0.0		1.2	8.7	15
13	117.1	42.chn	4A6	6.5	44	B	8E+05	2E+06	13.6	0.7	0.3	0.91	1.2	0.03	1.08	1.2	0.04	2.0	14.0	0.8	0.12	10.0	0.04	0.03	19.0	0.01	1.5	5.4	0.2	0.0		1.2	7.5	5
13	117.1	43.chn	4A6	6.5	44	E	8E+05	2E+06	13.5	0.7	0.3	0.94	1.2	0.03	1.05	1.2	0.04	2.1	12.0	0.8	0.08	13.0	0.03	0.02	26.0	0.01	3.9	2.2	0.3	0.0		1.2	7.4	25
13	197	359.chn	4A6	6.5	44	5E	8E+05	2E+06	20.7	0.3	0.2	0.99	0.6	0.02	1.38	0.5	0.02	1.9	7.5	0.4	0.05	8.3	0.01	0.09	28.4	0.08	0.3	11.8	0.1	0.4	41.0	0.5	9.7	10
13	197	45.chn	4A6	6.5	44	F	7E+05	2E+06	21.3	0.6	0.4	1.21	1.1	0.04	1.50	1.0	0.05	3.4	9.5	1.0	0.10	12.0	0.04	0.01	40.0	0.02	22.3	0.6	0.4	1.1	35.0	1.2	10.7	5
13	197	59.chn	4A6	6.5	44	F	7E+05	2E+06	20.6	0.3	0.2	1.04	0.6	0.02	1.43	0.5	0.02	2.7	5.5	0.4	0.08	7.0	0.02	0.01	20.5	0.01	20.5	0.3	0.2	0.6	30.4	0.6	10.1	0
13	197	46.chn	4A6	6.5	44	G	7E+05	2E+06	18.3	0.6	0.3	0.99	1.2	0.04	1.18	1.1	0.04	2.7	11.5	0.9	0.08	13.0	0.03	0.02	25.6	0.02	47.7	0.4	0.6	0.0		1.2	9.3	20
13	197	357.chn	4A6	6.5	44	5C	8E+05	2E+06	23.4	0.3	0.2	1.05	0.6	0.02	1.52	0.5	0.02	2.6	5.7	0.4	0.06	8.2	0.01	0.10	28.9	0.09	2.0	2.2	0.1	0.8	16.7	0.4	10.8	15
13		83.chn	4A6	6.5	44	JJ	7E+05	2E+06	18.4	0.6	0.3	1.01	1.2	0.04	1.23	1.1	0.04	2.5	11.1	0.8	0.08	13.0	0.03	0.04	13.1	0.02	1.9	4.3	0.3	0.0		1.2	8.8	20
13	197	358.chn	4A6	6.5	44	5D	7E+05	2E+06	23.1	0.3	0.2	1.11	0.6	0.02	1.52	0.5	0.02	5.6	3.0	0.5	0.13	5.5	0.02	0.02	15.8	0.01	82.6	0.1	0.2	3.4	4.4	0.5	12.2	5
13		84.chn	4A6	6.5	44	KK	7E+05	2E+06	20.6	0.6	0.4	1.00	1.2	0.04	1.08	1.2	0.04	3.8	7.6	0.9	0.09	13.0	0.04	0.00		0.01	1.6	5.2	0.2	0.0		1.2	9.0	30
13		85.chn	4A6	6.5	44	LL	7E+05	2E+06	19.0	0.6	0.3	1.09	1.2	0.04	1.11	1.3	0.04	6.5	5.0	1.0	0.09	14.0	0.04	0.02	37.0	0.02	0.0		0.2	0.0		1.2	9.4	25
13		86.chn	4A6	6.5	44	MM	7E+05	2E+06	20.7	0.6	0.4	1.21	1.2	0.04	1.67	1.0	0.05	13.1	2.8	1.1	0.12	13.0	0.05	0.00		0.02	0.0		0.2	0.0		1.2	12.2	30
13		87.chn	4A6	6.5	44	NN	7E+05	2E+06	21.6	0.6	0.4	1.09	1.2	0.04	1.31	1.1	0.04	5.4	6.0	1.0	0.06	17.0	0.03	0.01	47.0	0.02	0.0		0.2	0.0		1.2	10.2	0
13		88.chn	4A6	6.5	44	OO	7E+05	2E+06	20.4	0.6	0.4	1.26	1.0	0.04	1.49	1.0	0.04	2.5	12.4	0.9	0.07	15.0	0.03	0.00		0.02	0.0		0.2	0.0		1.2	10.8	0
13		89.chn	4A6	6.5	44	PP	7E+05	2E+06	16.7	0.7	0.4	1.02	1.2	0.04	1.15	1.2	0.04	2.0	15.4	0.9	0.09	13.0	0.03	0.00		0.02	0.0		0.2	0.0		1.2	8.8	15
13		92.chn	4A6	6.5	44	QQ	7E+05	2E+06	19.8	0.6	0.4	1.01	1.2	0.04	1.42	1.0	0.04	2.7	11.5	0.9	0.06	17.0	0.03	0.00		0.02	0.0		0.2	0.0		1.2	9.9	40
13		93.chn	4A6	6.5	44	RR	7E+05	2E+06	20.7	0.6	0.4	1.00	1.2	0.04	1.40	1.0	0.04	3.7	8.7	1.0	0.07	15.0	0.03	0.00		0.02	0.0		0.2	0.0		1.2	9.7	60
13		94.chn	4A6	6.5	44	SS	7E+05	2E+06	19.0	0.6	0.3	1.10	1.1	0.04	1.14	1.2	0.04	8.8	3.8	1.0	0.10	13.0	0.04	0.05	11.1	0.02	0.3	32.0	0.3	0.0		1.2	9.3	10
13		96.chn	4A6	6.5	44	TT	7E+05	2E+06	15.0	0.7	0.3	0.85	2.5	0.06	1.09	2.2	0.07	49.9	1.3	1.9	0.60	6.0	0.11	0.10	13.0	0.04	1.8	6.4	0.4	0.0		1.2	23.0	40
13		97.chn	4A6	6.5	44	UU	7E+05	2E+06	22.0	0.6	0.4	0.96	1.3	0.04	1.22	1.2	0.04	4.4	7.2	0.9	0.07	16.0	0.04	0.03	21.6	0.02	0.3	26.8	0.3	0.0		1.2	9.8	0
13		98.chn	4A6	6.5	44	VV	7E+05	2E+06	17.8	0.7	0.4	0.93	1.3	0.04	1.26	1.1	0.04	1.8	16.6	0.9	0.06	18.0	0.03	0.06	9.4	0.02	1.4	6.5	0.3	0.0		1.2	8.9	0
13		100.chn	4A6	6.5	44	WW	7E+05	2E+06	15.9	0.8	0.4	0.81	1.5	0.04	1.09	1.3	0.04	2.2	13.2	0.9	0.05	20.0	0.03	0.05	11.7	0.02	1.4	6.1	0.3	0.0		1.2	7.8	0
13		99.chn	4A6	6.5	44	WW	7E+05	2E+06	15.4	0.7	0.3	0.84	1.4	0.04	1.08	1.2	0.04	2.0	13.5	0.8	0.06	17.0	0.03	0.04	12.7	0.02	1.4	5.7	0.2	0.0		1.2	7.8	0
13		101.chn	4A6	6.5	44	XX	7E+05	2E+06	16.9	0.7	0.4	0.80	1.4	0.03	1.27	1.1	0.04	0.0		0.8	0.09	14.0	0.04	0.06	9.4	0.02	3.4	2.6	0.3	0.0		1.2	8.6	0
13	197	196.chn	6A6	6.5	44	9X	7E+05	2E+06	15.5	0.3	0.1	0.93	0.6	0.02	1.12	0.6	0.02	3.3	6.2	0.6	0.11	5.8	0.02	0.05	6.2	0.01	127.0	0.1	0.4	2.2	6.2	0.4	9.4	40
13	197	197.chn	6A6	6.5	44	9Y	7E+05	2E+06	18.2	0.3	0.2	1.09	0.6	0.02	1.33	0.5	0.02	3.4	6.2	0.6	0.09	6.3	0.02	0.03	10.3	0.01	79.6	0.1	0.2	1.8	7.9	0.4	9.9	5
13	117.2	198.chn	6A6	6.5	44	9Z	7E+05	2E+06	21.2	0.3	0.2	1.21	0.5	0.02	1.76	0.4	0.02	2.3	9.5	0.6	0.07	6.9	0.02	0.02	16.7	0.01	14.6	0.4	0.2	0.7	29.9	0.6	10.7	20

OU	IHSS Number	File Name	Detector Array	Detector Height (m)	FOV m	Station	North feet	East feet	K-40 pCi/g	% Error	MDA pCi/g	Ra-226 pCi/g	% Error	MDA pCi/g	Th-232 pCi/g	% Error	MDA pCi/g	U-238 pCi/g	% Error	MDA pCi/g	U-235 pCi/g	% Error	MDA pCi/g	Cs-137 pCi/g	% Error	MDA pCi/g	Am-241 pCi/g	% Error	MDA pCi/g	Pu-239 nCi/g	% Error	MDA nCi/g	Exposure uR/h	% FOV Blocked
13		207.chn	6A6	6.5	44	10E	8E+05	2E+06	11.5	0.4	0.1	0.70	0.7	0.01	0.94	0.6	0.02	1.7	10.1	0.5	0.06	7.8	0.01	0.02	10.1	0.01	2.2	1.8	0.1	0.0		0.4	5.9	30
13		210.chn	6A6	6.5	44	10F	7E+05	2E+06	34.1	0.3	0.3	1.52	0.7	0.03	2.42	0.5	0.04	10.4	4.1	1.3	1.18	1.6	0.06	0.64	1.0	0.02	468.0	0.0	0.2	27.2	1.1	0.9	70.6	0
13		213.chn	6A6	6.5	44	10G	7E+05	2E+06	20.9	0.3	0.2	0.87	0.7	0.02	1.46	0.5	0.02	5.4	4.1	0.7	0.09	7.0	0.02	0.01	35.0	0.01	5.2	1.0	0.2	1.0	15.2	0.4	9.6	10
13		214.chn	6A6	6.5	44	10H	7E+05	2E+06	21.2	0.3	0.2	0.88	0.7	0.02	1.55	0.5	0.02	4.9	5.6	0.8	0.20	4.5	0.03	0.08	4.2	0.01	452.0	0.0	0.2	8.9	1.9	0.5	15.5	10
13		215.chn	6A6	6.5	44	10I	8E+05	2E+06	18.9	0.3	0.2	0.76	0.8	0.02	1.24	0.5	0.02	1.5	13.4	0.6	0.08	7.5	0.17	0.00		0.01	0.0		0.1	0.0		0.4	8.0	30
14	161	158.chn	4A6	6.5	44	4G	7E+05	2E+06	16.2	0.4	0.2	0.74	0.8	0.02	1.04	0.6	0.02	1.7	8.3	0.4	0.06	9.0	0.02	0.05	6.1	0.01	7.1	0.7	0.1	0.0		0.0	7.7	15
14	161	159.chn	4A6	6.5	44	4H	7E+05	2E+06	16.5	0.3	0.1	0.64	0.9	0.02	1.11	0.6	0.02	1.7	8.0	0.4	0.05	10.0	0.02	0.02	12.1	0.01	11.8	0.4	0.1	1.3	10.5	0.4	7.9	0
14	161	164.chn	4A6	6.5	44	4K	7E+05	2E+06	14.6	0.4	0.2	0.78	0.7	0.02	0.86	0.7	0.02	2.3	5.8	0.4	0.06	8.0	0.02	0.03	8.9	0.01	8.5	0.6	0.2	1.8	6.8	0.4	7.2	50
14	160	163.chn	4A6	6.5	44	4J	7E+05	2E+06	20.2	0.3	0.2	1.09	0.6	0.02	1.25	0.5	0.02	2.0	6.9	0.4	0.05	8.0	0.01	0.02	12.4	0.01	1.5	2.7	0.1	0.0		0.0	9.4	0
14	160	162.chn	4A6	6.5	44	4I	7E+05	2E+06	20.1	0.3	0.2	1.01	0.6	0.02	1.17	0.6	0.02	2.1	6.8	0.4	0.05	8.0	0.01	0.03	9.5	0.01	12.4	0.4	0.1	0.5	36.0	0.5	9.1	25
14	162	140.chn	4A6	6.5	44	3U	7E+05	2E+06	20.1	0.3	0.2	1.14	0.6	0.02	1.86	0.4	0.02	3.1	4.8	0.4	0.08	7.0	0.02	0.01	35.0	0.01	0.0		0.0	0.0		0.0	11.0	50
14	162	141.chn	4A6	6.5	44	3V	7E+05	2E+06	16.3	0.3	0.1	1.09	0.6	0.02	0.92	0.7	0.02	4.9	3.0	0.4	0.05	8.0	0.01	0.00		0.00	1.3	3.3	0.1	0.0		0.0	8.3	60
14	162	143.chn	4A6	6.5	44	3X	7E+05	2E+06	18.3	0.3	0.2	0.88	0.7	0.02	0.95	0.7	0.02	6.7	2.2	0.4	0.10	6.0	0.02	0.00		0.00	0.0		0.0	0.0		0.0	8.3	60
14	162	17.chn	6A6	6.5	44	6M	7E+05	2E+06	10.6	0.4	0.1	0.72	0.7	0.02	0.84	0.7	0.02	2.6	5.4	0.4	0.16	4.8	0.02	0.03	7.5	0.01	28.2	0.3	0.3	8.0	1.7	0.4	6.5	60
14	162	18.chn	6A6	6.5	44	6N	7E+05	2E+06	24.3	0.3	0.2	1.26	0.6	0.02	2.02	0.4	0.02	4.8	5.5	0.8	0.14	6.3	0.03	0.12	3.1	0.01	1070.0	0.0	0.0	45.9	0.5	0.7	26.3	5
14	162	142.chn	4A6	6.5	44	3W	7E+05	2E+06	19.6	0.3	0.2	1.01	0.6	0.02	0.97	0.7	0.02	5.6	2.7	0.5	0.06	8.0	0.01	0.01	48.0	0.01	0.0		0.0	0.0		0.0	8.8	60
14	162	24.chn	6A6	6.5	44	6R	8E+05	2E+06	18.9	0.3	0.2	0.99	0.7	0.02	1.59	0.5	0.02	2.3	7.6	0.5	0.08	9.1	0.02	0.05	7.3	0.01	0.7	5.9	0.1	5.7	3.4	0.6	10.9	10
14	162	27.chn	6A6	6.5	44	6S	8E+05	2E+06	16.0	0.3	0.1	0.82	0.7	0.02	1.45	0.5	0.02	2.3	5.8	0.4	0.07	7.7	0.02	0.01	21.9	0.01	1.7	2.1	0.1	1.4	9.8	0.4	8.1	50
14	162	28.chn	6A6	6.5	44	6T	8E+05	2E+06	17.0	0.3	0.2	0.88	0.7	0.02	1.33	0.5	0.02	2.4	5.5	0.4	0.06	7.9	0.01	0.01	21.3	0.01	0.0		0.0	0.0		0.0	8.2	20
14	162	22.chn	6A6	6.5	44	6P	8E+05	2E+06	19.5	0.3	0.2	0.87	0.7	0.02	1.42	0.5	0.02	2.2	7.1	0.5	0.08	7.8	0.02	0.02	18.2	0.01	8.6	0.6	0.2	7.2	2.2	0.5	9.6	30
14	162	19.chn	6A6	6.5	44	6O	7E+05	2E+06	19.9	0.3	0.2	1.06	0.6	0.02	1.63	0.5	0.02	2.6	6.1	0.5	0.07	8.0	0.02	0.03	12.0	0.01	91.5	0.1	0.3	5.0	3.2	0.5	11.2	5
14	162	144.chn	4A6	6.5	44	3Y	7E+05	2E+06	18.0	0.3	0.2	0.87	0.7	0.02	1.03	0.6	0.02	8.3	1.9	0.5	0.10	7.0	0.02	0.02	16.4	0.01	0.0		0.0	0.0		0.0	8.8	50
14	162	23.chn	6A6	6.5	44	6Q	8E+05	2E+06	19.1	0.3	0.2	0.95	0.7	0.02	1.68	0.4	0.02	2.8	5.2	0.4	0.09	6.9	0.02	0.01	23.7	0.01	0.4	10.7	0.1	1.5	9.6	0.4	9.6	30
14	164.3	112.chn	4A6	6.5	44	3G	7E+05	2E+06	18.9	0.3	0.2	0.76	1.0	0.02	1.22	0.7	0.03	21.9	0.9	0.6	0.34	3.0	0.03	0.04	10.8	0.01	0.3	16.1	0.1	0.0		0.0	13.0	0
14	131	29.chn	6A6	6.5	44	6U	8E+05	2E+06	12.8	0.4	0.2	0.73	0.7	0.02	0.79	0.7	0.02	1.6	7.7	0.4	0.05	8.9	0.01	0.01	28.5	0.01	0.9	3.8	0.1	0.0		0.0	6.2	25
14	164.3	127.chn	4A6	6.5	44	3L	7E+05	2E+06	16.3	0.3	0.1	0.81	0.9	0.02	1.09	0.8	0.03	26.0	0.8	0.6	0.31	4.0	0.04	0.05	9.1	0.01	0.0		0.0	0.0		0.0	12.7	0
14	164.3	113.chn	4A6	6.5	44	3H	7E+05	2E+06	18.4	0.3	0.2	0.92	0.9	0.02	1.20	3.0	0.11	29.3	0.8	0.7	0.44	3.0	0.04	0.02	29.6	0.01	0.0		0.0	0.0		0.0	15.5	0
14	164.2	137.chn	4A6	6.5	44	3T	7E+05	2E+06	19.3	0.3	0.2	1.05	0.6	0.02	1.35	0.5	0.02	4.5	3.4	0.5	1.74	1.0	0.05	0.02	13.6	0.01	0.0		0.0	0.0		0.0	9.8	0
14	164.2	136.chn	4A6	6.5	44	3S	7E+05	2E+06	20.9	0.3	0.2	1.14	0.6	0.02	1.39	0.5	0.02	4.8	3.3	0.5	0.06	8.0	0.01	0.02	18.3	0.01	0.0		0.0	0.0		0.0	10.1	50
14	164.2	135.chn	4A6	6.5	44	3R	7E+05	2E+06	18.5	0.3	0.2	1.16	0.6	0.02	1.68	0.4	0.02	3.7	4.1	0.5	0.05	8.0	0.01	0.03	11.0	0.01	0.0		0.0	0.0		0.0	10.4	60
14	164.2	134.chn	4A6	6.5	44	3Q	7E+05	2E+06	15.2	0.3	0.1	1.15	0.5	0.02	1.26	0.5	0.02	2.2	6.4	0.4	0.07	7.0	0.01	0.05	5.3	0.01	0.1	27.7	0.1	0.0		0.0	8.5	50
14	164.2	133.chn	4A6	6.5	44	3P	7E+05	2E+06	10.8	0.4	0.1	0.96	0.6	0.02	0.93	0.6	0.02	1.9	6.9	0.4	0.04	9.0	0.01	0.07	3.9	0.01	0.0		0.0	0.0		0.0	6.6	75
14	161	96.chn	6A6	6.5	44	664E	7E+05	2E+06	24.2	0.5	0.4	0.82	1.7	0.04	1.25	1.3	0.05	16.5	2.4	1.2	0.12	13.9	0.05	0.00		0.00	30.5	0.5	0.5	4.4	8.5	1.1	11.6	40
14	161	99.chn	6A6	6.5	44	664H	7E+05	2E+06	13.8	0.6	0.2	0.62	1.4	0.03	0.54	1.5	0.02	1.7	12.3	0.6	0.03	14.9	0.01	0.00		0.00	19.7	0.5	0.3	3.5	5.9	0.6	6.1	35
BKG		12.chn	5A6	6.5	44	5W	8E+05	2E+06	6.8	0.5	0.1	0.92	0.6	0.02	1.04	0.6	0.02	1.8	6.3	0.3	0.06	6.4	0.01	0.84	0.5	0.01	0.0		0.0	0.0		0.0	6.1	0
BKG		13.chn	5A6	6.5	44	5X	8E+05	2E+06	12.4	0.4	0.1	1.13	0.5	0.02	1.25	0.5	0.02	2.3	5.8	0.4	0.10	5.5	0.02	0.78	0.6	0.01	0.0		0.0	0.0		0.0	8.3	0
BKG		4.chn	5A6	6.5	44	5S	8E+05	2E+06	8.2	0.5	0.1	0.68	0.7	0.01	1.02	0.6	0.02	1.8	6.0	0.3	0.08	6.2	0.01	0.78	0.6	0.01	0.0		0.0	0.0		0.0	6.0	0
BKG		16.chn	5A6	6.5	44	5Y	7E+05	2E+06	5.2	0.6	0.1	0.79	0.6	0.01	1.04	0.5	0.02	1.9	5.5	0.3	0.07	6.5	0.01	0.64	0.6	0.01	0.1	33.0	0.1	0.0		0.0	5.5	0
BKG		22.chn	5A6	6.5	44	5Y	7E+05	2E+06	5.3	0.6	0.1	0.74	0.7	0.02	1.06	0.5	0.02	1.8	5.7	0.3	0.07	6.1	0.01	0.65	0.6	0.01	0.0		0.0	0.0		0.0	5.5	0
BKG		21.chn	5A6	6.5	44	6B	7E+05	2E+06	5.1	0.6	0.1	0.72	0.7	0.02	1.11	0.5	0.02	2.0	5.2	0.3	0.08	5.8	0.01	0.56	0.7	0.01	0.0		0.0	0.0		0.0	5.5	0
BKG		17.chn	5A6	6.5	44	5Z	7E+05	2E+06	6.2	0.5	0.1	0.80	0.6	0.01	0.88	0.6	0.02	1.7	6.4	0.3	0.05	7.8	0.01	0.63	0.7	0.01	0.1	42.0	0.1	0.0		0.0	5.4	0
BKG		23.chn	5A6	6.5	44	5Z	7E+05	2E+06	6.2	0.6	0.1	0.70	0.7	0.01	0.90	0.6	0.02	1.6	6.8	0.3	0.06	7.2	0.01	0.63	0.6	0.01	0.0		0.0	0.0		0.0	5.2	0
BKG		9.chn	5A6	6.5	44	5V	8E+05	2E+06	11.5	0.4	0.1	0.67	0.8	0.02	0.90	0.6	0.02	1.9	6.2	0.4	0.08	6.8	0.02	0.35	1.0	0.01	0.0		0.0	0.0		0.0	6.1	0
BKG		18.chn	5A6	6.5	44	6A	8E+05	2E+06	9.5	0.4	0.1	0.87	0.6	0.02	1.00	0.6	0.02	1.8	6.4	0.3	0.07	6.3	0.01	0.65	0.6	0.01	0.0		0.0	0.0		0.0	6.4	0
BKG		8.chn	5A6	6.5	44	5U	7E+05	2E+06	12.3	0.4	0.1	0.88	0.6	0.02	1.25	0.5	0.02	1.9	6.9	0.4	0.10	5.9	0.02	0.21	1.5	0.01	0.0		0.0	0.0		0.0	7.6	0
BKG		3.chn	5A6	6.5	44	5R	8E+05	2E+06	11.6	0.4	0.1	0.75	0.7	0.02	1.08	0.6	0.02	2.0	6.1	0.4	0.08	6.6	0.02	0.35	1.0	0.01	0.0		0.0	0.0		0.0	6.8	0
BKG		7.chn	5A6	6.5	44	5T	7E+05	2E+06	12.8	0.4	0.2	0.93	0.6	0.02	1.21	0.5	0.02	2.3	5.8	0.4	0.10	5.7	0.02	0.36	1.0	0.01	0.0		0.0	0.0		0.0	7.8	0
CnY		388.chn	4A6	6.5	44	5P	7E+05	2E+06	10.0	0.4	0.1	0.75	0.7	0.02	0.77	0.7	0.02	1.7	6.7	0.3	0.05	8.2	0.01	0.07	3.7	0.01	0.0		0.0	0.0		0.0	5.7	0
CnY		389.chn	4A6	6.5	44	5Q	7E+05	2E+06	9.8	0.4	0.1	0.93	0.6	0.02	0.72	0.8	0.02	1.5	8.2	0.4	0.05	7.9	0.01	0.01	15.2	0.01	0.0		0.0	0.0		0.0	5.9	0

OU	IHSS Number	File Name	Detector Array	Detector Height (m)	FOV m	Station	North feet	East feet	K-40 pCi/g	% Error	MDA pCi/g	Ra-226 pCi/g	% Error	MDA pCi/g	Th-232 pCi/g	% Error	MDA pCi/g	U-238 pCi/g	% Error	MDA pCi/g	U-235 pCi/g	% Error	MDA pCi/g	Cs-137 pCi/g	% Error	MDA pCi/g	Am-241 pCi/g	% Error	MDA pCi/g	Pu-239 nCi/g	% Error	MDA nCi/g	Exposure uR/h	% FOV Blocked
RFP		59.chn	6A6	6.5	44	7J	8E+05	2E+06	10.6	0.4	0.1	0.78	0.7	0.02	0.96	0.6	0.02	1.8	9.4	0.5	0.09	6.1	0.02	0.07	3.6	0.01	0.0		0.0	0.0		0.0	6.0	0
RFP		60.chn	6A6	6.5	44	7K	8E+05	2E+06	11.1	0.4	0.1	0.87	0.6	0.02	1.17	0.5	0.02	2.0	8.9	0.5	0.09	5.9	0.02	0.52	0.8	0.01	0.0		0.0	0.0		0.0	7.2	0
RFP		61.chn	6A6	6.5	44	7L	8E+05	2E+06	10.6	0.4	0.1	0.90	0.6	0.02	1.20	0.5	0.02	1.8	9.8	0.5	0.07	6.8	0.01	0.31	1.1	0.01	0.0		0.0	0.0		0.0	7.1	0
RFP		103.chn	6A6	1	10	8D	8E+05	2E+06	5.3	1.1	0.2	0.57	1.4	0.02	0.65	1.2	0.02	1.2	18.0	0.7	0.06	9.8	0.02	0.69	1.1	0.02	0.0		0.0	0.0		0.0	4.4	0
RFP		117.chn	6A6	6.5	44	8K	8E+05	2E+06	11.3	0.4	0.1	1.02	0.6	0.02	1.45	0.5	0.02	1.7	10.5	0.5	0.11	5.5	0.02	0.67	0.7	0.01	0.3	13.7	0.1	0.0		0.0	8.2	0
RFP		118.chn	6A6	6.5	44	8L	8E+05	2E+06	10.7	0.4	0.1	0.92	0.6	0.02	1.30	0.5	0.02	1.8	9.8	0.5	0.11	5.4	0.02	0.65	0.7	0.01	0.3	12.8	0.1	0.0		0.0	7.4	0
RFP		119.chn	6A6	6.5	44	8M	8E+05	2E+06	12.0	0.4	0.1	0.95	0.6	0.02	1.41	0.5	0.02	1.6	11.2	0.5	0.10	5.9	0.02	0.57	0.7	0.01	0.3	13.4	0.1	0.0		0.0	8.0	0
RFP		120.chn	6A6	6.5	44	8N	8E+05	2E+06	11.7	0.4	0.1	0.84	0.7	0.02	1.20	0.5	0.02	1.6	11.0	0.5	0.08	6.5	0.02	0.72	0.6	0.01	0.2	16.3	0.1	0.0		0.0	7.3	0
RFP		123.chn	6A6	6.5	44	8O	8E+05	2E+06	10.9	0.4	0.1	1.00	0.6	0.02	1.18	0.5	0.02	1.9	9.5	0.5	0.09	5.9	0.02	0.69	0.6	0.01	0.3	14.2	0.1	0.0		0.0	7.4	0
RFP		124.chn	6A6	6.5	44	8P	8E+05	2E+06	10.1	0.4	0.1	1.00	0.6	0.02	1.05	0.6	0.02	1.8	9.5	0.5	0.09	5.8	0.02	0.48	0.8	0.01	0.1	27.9	0.1	0.0		0.0	6.7	0
RFP		125.chn	6A6	6.5	44	8Q	8E+05	2E+06	8.4	0.5	0.1	0.96	0.6	0.02	0.96	0.6	0.02	1.9	6.3	0.4	0.08	5.9	0.01	0.69	0.6	0.01	0.3	14.1	0.1	0.0		0.0	6.2	0
RFP		126.chn	6A6	6.5	44	8R	8E+05	2E+06	11.2	0.4	0.1	1.07	0.6	0.02	1.30	0.5	0.02	2.1	6.2	0.4	0.08	6.0	0.02	0.78	0.6	0.01	0.2	16.1	0.1	0.0		0.0	7.9	0
RFP		129.chn	6A6	6.5	44	8S	8E+05	2E+06	11.8	0.4	0.1	1.10	0.6	0.02	1.37	0.5	0.02	1.5	12.2	0.6	0.09	6.0	0.02	0.75	0.6	0.01	0.3	12.2	0.1	0.0		0.0	8.4	0
RFP		130.chn	6A6	6.5	44	8T	8E+05	2E+06	10.2	0.4	0.1	1.14	0.5	0.02	1.19	0.5	0.02	1.5	11.7	0.5	0.09	5.6	0.02	0.56	0.7	0.01	0.0		0.0	0.0		0.0	7.4	0
RFP		131.chn	6A6	6.5	44	8U	8E+05	2E+06	11.3	0.4	0.1	1.17	0.5	0.02	1.31	0.5	0.02	2.0	9.1	0.5	0.11	5.1	0.02	0.61	0.7	0.01	0.1	32.7	0.1	0.0		0.0	8.1	0
RFP		132.chn	6A6	6.5	44	8V	8E+05	2E+06	10.5	0.4	0.1	1.07	0.5	0.02	1.13	0.6	0.02	1.6	11.2	0.5	0.08	6.2	0.01	0.61	0.7	0.01	0.2	20.7	0.1	0.0		0.0	7.4	0
RFP		135.chn	6A6	6.5	44	8W	7E+05	2E+06	11.2	0.4	0.1	1.00	0.6	0.02	1.48	0.5	0.02	1.5	11.8	0.5	0.09	6.0	0.02	0.57	0.7	0.01	0.3	11.7	0.1	0.0		0.0	7.9	0
RFP		136.chn	6A6	6.5	44	8X	7E+05	2E+06	12.4	0.4	0.1	1.08	0.6	0.02	1.60	0.4	0.02	1.6	11.5	0.6	0.08	6.3	0.02	0.74	0.6	0.01	0.5	8.8	0.1	0.0		0.0	8.8	0
RFP		137.chn	6A6	6.5	44	8Y	7E+05	2E+06	10.6	0.4	0.1	1.02	0.6	0.02	1.47	0.5	0.02	1.8	10.0	0.5	0.07	7.0	0.01	0.76	0.6	0.01	0.5	7.8	0.1	0.0		0.0	8.2	0
RFP		138.chn	6A6	6.5	44	8Z	7E+05	2E+06	9.2	0.4	0.1	0.92	0.6	0.02	1.37	0.5	0.02	2.2	5.7	0.4	0.07	7.0	0.01	0.75	0.6	0.01	0.3	11.9	0.1	0.0		0.0	7.4	0
RFP		141.chn	6A6	6.5	44	9A	7E+05	2E+06	11.1	0.4	0.1	1.18	0.5	0.02	1.55	0.5	0.02	1.5	12.7	0.6	0.09	5.9	0.02	0.82	0.6	0.01	0.4	10.1	0.1	0.0		0.0	8.6	0
RFP		142.chn	6A6	6.5	44	9B	7E+05	2E+06	9.7	0.4	0.1	1.21	0.5	0.02	1.40	0.5	0.02	1.6	10.9	0.5	0.09	5.7	0.01	0.77	0.6	0.01	0.3	12.2	0.1	0.0		0.0	8.0	0
RFP		143.chn	6A6	6.5	44	9C	7E+05	2E+06	10.8	0.4	0.1	1.26	0.5	0.02	1.54	0.5	0.02	1.8	10.2	0.6	0.08	6.1	0.01	0.71	0.7	0.01	0.3	14.0	0.1	0.0		0.0	8.7	0
IA		165.chn	6A6	6.5	44	9M	8E+05	2E+06	16.8	0.3	0.2	0.95	0.6	0.02	1.21	0.5	0.02	2.6	7.4	0.6	0.07	7.3	0.01	0.02	12.8	0.01	0.2	17.8	0.1	0.0		0.0	8.0	10
IA		166.chn	6A6	6.5	44	9N	8E+05	2E+06	17.4	0.3	0.2	0.94	0.6	0.02	1.23	0.5	0.02	1.9	10.3	0.6	0.06	7.4	0.01	0.02	13.7	0.01	0.3	14.2	0.1	0.0		0.0	8.3	0
IA		169.chn	6A6	6.5	44	9O	8E+05	2E+06	15.0	0.3	0.1	0.84	0.7	0.02	1.17	0.5	0.02	1.8	10.3	0.6	0.07	6.9	0.02	0.06	5.0	0.01	1.2	3.1	0.1	0.0		0.0	7.5	20
IA		170.chn	6A6	6.5	44	9P	8E+05	2E+06	14.2	0.3	0.1	0.79	0.7	0.02	1.11	0.6	0.02	1.8	10.0	0.5	0.07	7.3	0.02	0.08	3.6	0.01	1.5	2.4	0.1	0.0		0.0	7.1	20
IA		171.chn	6A6	6.5	44	9Q	8E+05	2E+06	14.3	0.3	0.1	0.78	0.7	0.02	1.11	0.6	0.02	1.9	9.6	0.5	0.07	7.0	0.02	0.08	3.5	0.01	1.5	2.5	0.1	0.0		0.0	7.0	20
IA		174.chn	6A6	6.5	44	9R	7E+05	2E+06	21.0	0.3	0.2	1.06	0.6	0.02	1.72	0.4	0.02	1.8	11.7	0.6	0.07	7.3	0.02	0.01	23.0	0.01	1.6	2.6	0.1	0.5	41.0	0.6	10.2	20
IA		175.chn	6A6	6.5	44	9S	7E+05	2E+06	18.7	0.3	0.2	1.11	0.6	0.02	1.16	0.6	0.02	2.0	9.7	0.6	0.06	7.4	0.01	0.03	9.3	0.01	0.2	19.9	0.1	0.0		0.0	8.4	10
IA		178.chn	6A6	6.5	44	9T	7E+05	2E+06	18.1	0.3	0.2	0.88	0.7	0.02	1.16	0.6	0.02	2.1	6.5	0.4	0.06	7.9	0.01	0.06	4.7	0.01	0.0		0.0	0.0		0.0	8.2	10
IA		179.chn	6A6	6.5	44	9U	7E+05	2E+06	14.4	0.3	0.1	0.79	0.7	0.02	1.00	0.6	0.02	1.6	11.4	0.5	0.08	6.8	0.02	0.06	4.9	0.01	0.0		0.0	0.0		0.0	6.9	10
IA		180.chn	6A6	6.5	44	9V	7E+05	2E+06	16.7	0.3	0.2	0.82	0.7	0.02	1.24	0.5	0.02	1.8	10.5	0.6	0.09	6.7	0.02	0.07	3.9	0.01	0.0		0.0	0.0		0.0	7.9	5
IA		181.chn	6A6	6.5	44	9W	7E+05	2E+06	13.6	0.4	0.2	0.75	0.7	0.02	1.11	0.6	0.02	1.7	10.5	0.5	0.07	7.4	0.02	0.09	3.0	0.01	0.0		0.0	0.0		0.0	6.9	0

Am-241 = americium-241   Cs-137 = cesium-137   FOV = field of view   K-40 = potassium-40   m = meter   MDA = maximum detectable activity   pCi/g = picocuries per gram

Pu-239 = plutonium-239   Ra-226 = radium-226   Th-232 = thorium-232   U-235 = uranium-235   U-238 = uranium-238   μR/h = micro Roentgens per hour

APPENDIX D

Original Process Waste Line
Pipeline Data Summary Sheets

APPENDIX D

Original Process Waste Line
Pipeline Data Summary Sheets

The following Original Process Waste Line (OPWL) Data Summary Sheets contain information regarding pipeline location, physical configuration, past usage, and current status for each of the 66 known OPWL pipelines. Pipeline locations are keyed to the utility location maps provided in Volume IIB. References are keyed to the list of references at the end of the section.

In many instances, individual references contain conflicting information about a given pipeline. Because independent verification of this information generally is not possible, all conflicting information is presented with appropriate referencing.

OPWL PIPE DATA SUMMARY: P-1

Location

Building or Area: Building 123
General Location: South of Building 123[9,10]
Location - Features:

North	East	Elev	Feature
36113.66	18545.5		pit within Building 123
36104	18545.5		southern end of west side of Building 123
36061.5	18545.5		manhole
36061.5	18619.3		manhole (intersection with P-2 & P-3)

source: 15501-40 and 38849-400

Physical Description

Configuration: 3 inch polyethylene inside 4 inch steel pipe[1,4,9,10]
Total Length: 180 feet[1]
120 feet[4]
Outside Length: 89 feet[2]
120 feet[9]
OPWL Connections: P-2 (4-inch cast-iron pipe) at Building 123[10]
P-3 (4-inch vitrified-clay pipe) south of Building 123[9,10]

Past Usage and Current Status

Date of Installation: 1968[1,4]
Date of Abandonment: Part abandoned in June 1982[1]
Current Status: Abandoned[1,2]
Portion of pipeline converted to New Transfer System (See comments.)
Waste Source: Building 123[10]

Release History

Known Releases: None[1]
Entire pipeline identified on location map as area of reported release[10]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-040-M	7/20/83	7/20/9	0UTILITY LAYOUT (E-2)
6378-X05-24	8/21/81		REPLACE PROCESS WASTE SYSTEM ABANDONMENT & REMOVAL PLAN
26378-005-29	8/21/81	1/20/87	REPLACE PROCESS WASTE SYSTEM EQUIPMENT & PIPING BUILDING 866
26378-X04-23	8/21/81		REPLACE PROCESS WASTE SYSTEM ABANDONMENT & REMOVAL PLAN
26378-001-25	8/21/81	1/20/87	REPLACE PROCESS WASTE SYSTEM PLAN & PROFILE
26378-X03-22	8/21/81		REPLACE PROCESS WASTE SYSTEM REMOVAL PLAN
26378-X01-20	8/21/81		REPLACE PROCESS WASTE SYSTEM REMOVAL PLANS & SECTIONS
20829-018	8/6/68		UTILITY LAYOUT VOID
26378-X02-21	8/21/81		REPLACE PROCESS WASTE SYSTEM REMOVAL PLAN
38849-400	7/89		UNDERGROUND DRAIN PIPING PLAN
5703-002	5/17/52	5/1/53	INDUSTRIAL WASTE PLAN & PROFILE BUILDING 81 & 74

Comments

Utility drawing[9] and drawing 38849-400 indicate that a portion of P-1 is part of the new process waste system.

OPWL PIPE DATA SUMMARY: P-2

Location

Building or Area:	Building 123
General Location:	Beneath Building 123[10]
Location - Features:	

Physical Description

Configuration:	4-inch cast iron[1,4]
Total Length:	452 feet[1]
Outside Length:	None[10]
OPWL Connections:	P-1 (3-inch polyethylene in 4-inch steel pipe) at Building 123[10] P-3 (4-inch vitrified-clay pipe) at Building 123[10]

Past Usage and Current Status

Date of Installation:	1952[1]
Date of Abandonment:	June 1982[1]
Current Status:	Piping inside or beneath Building 123. Decontaminated, removed, and replaced with inspectable pipe[1]
Waste Source:	Building 123[10]

Release History

Known Releases:	At P-2, beneath Building 123[1] Entire pipeline identified on location map as area of reported release[10]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-040-M	7/20/83	7/20/90	UTILITY LAYOUT (E-2)
27216-003-4	5/17/74	2/3/87	REPLACE PROCESS WASTE LINE PIPING DETAILS
23723	7/22/52	?	INDUSTRIAL WASTE FOR BUILDING NOS. 23 & 41, GENERAL PLAN & PROFILE
D-23723	8/13/52	7/6/72	INDUSTRIAL WASTE FOR BUILDINGS 23 & 41 PLAN & PROFILE
27216-001-2	5/17/74	1/19/87	REPLACE PROCESS WASTE LINE PIPING PLAN - AREA #1
27216-004-5	5/17/74	2/3/87	REPLACE PROCESS WASTE LINE PIPING DETAILS
D-23723	8/13/52	7/6/72	INDUSTRIAL WASTE FOR BUILDINGS 23 & 41 PLAN & PROFILE
1-11590-23	2/7/52	6/8/65	PLUMBING & SERVING PIPING ROOF DRAIN, SANITARY DRAIN & PROCESS DRAIN

Comments

None

OPWL PIPE DATA SUMMARY: P-3

Location

Building or Area:	Building 441
General Location:	West of Building 441[9,10]
Location - Features:	

Physical Description

Configuration:	4 inch vitrified clay[1,4,9,10]
Total Length:	162 feet[1,4]
Outside Length:	92 feet[2]
	158 feet[9]
OPWL Connections:	P-1 (3-inch polyethylene inside 4-inch steel pipe) south of Building 123[9,10]
	P-2 (4-inch cast iron pipe) south of Building 123
	T-2 at Building 441[9]

Past Usage and Current Status

Date of Installation:	1952[1,4]
Date of Abandonment:	June 1982[1]
Current Status:	Piping inside or beneath Building 441. Decontaminated, removed, and replaced with inspectable pipe[1]
	Abandoned[2,9,10]
Waste Source:	Building 123[10]

Release History

Known Releases:	None[1]
	Entire pipeline identified on location map as area of reported release[10]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-040-M	7/20/83	7/20/90	UTILITY LAYOUT (E-2)
23723	7/22/52	?	INDUSTRIAL WASTE FOR BUILDING NOS. 23 & 41, GENERAL PLAN & PROFILE
1-11590-23	2/7/52	6/8/65	PLUMBING & SERV PIPING ROOF DRAIN, SANITARY DRAIN and PROCESS DRAIN
D-23723	8/13/52	7/6/72	INDUSTRIAL WASTE FOR BUILDINGS 23 & 41 PLAN & PROFILE
RF-BZ-21622-31-26	8/18/69	10/28/71	ADDITION & RENOVATION SITE PLAN - UTILITIES
RF-BZ-21622-32-27	8/18/69	10/28/71	ADDITION & RENOVATION SITE PLAN - UTILITIES
21651-32	8/18/69	7/25/72	ADDITION & RENOVATION PLUMBING PLAN & ISO
D-23723	8/13/52	7/6/72	INDUSTRIAL WASTE FOR BUILDINGS 23 & 41 PLAN & PROFILE

Comments

Utility drawing(9) indicates part of P-3 lies beneath the south wing of Building 123.

Drawings(9,10) indicate a 6-inch ductile iron process waste line beneath Building 441 of indeterminate extent. This pipe was not identified as OPWL(10).

OPWL PIPE DATA SUMMARY: P-4

Location

Building or Area: Building 441
General Location: Building 429 to west of Building 879[9,10]
Location - Features:

North	East	Elev	Feature
36056	18790	6026.3	Building 429(south of 441); T-3
36056	19300	6016.7	valve pit (intersection with P-5)
36056	19350	6015.7	elbow
36030	19413	6014.6	elbow
36030	20560	5999.3	manhole (intersection with P-6)

source: 15501-40 through 15501-43, and 23723

Physical Description

Configuration: 4-inch cast iron pipe[1,4,9,10]
Total Length: 1750 feet[1,2]
Outside Length: 1773 feet[9]
OPWL Connections: P-5 (4-inch cast iron pipe) north of Building 444[9,10]
P-6 (3-inch steel pipe) at valve vault west of Building 879[9,10]
T-3 at Building 429[10]
T-2 at Building 429[10]

Past Usage and Current Status

Date of Installation: 1952[1,4]
Date of Abandonment: April 1981[1]
Current Status: Abandoned[1,2]
Waste Source: Buildings 123, 441, and 444[4,9,10]

Release History

Known Releases:	At intersection of P-4 with T-3, S1(?), and P-6 and at "two other locations"[1]
	Small leak found near delivery in Building 663 in 1960-62; small portion of line replaced, no subsequent reported leaks[4]
reported	Several sections of pipeline identified on location map as area of release[10]
	Leak of 2.5 gph @ 37 psig detected in 1971 pressure test[11]
	Leak indications found at the following locations: - 30 ft east of driveway south of Building 441. Two joints leaking. Repaired. - South of transformer bank between Buildings 441 and 443. Excavated, repaired. - South of Building 443. Excavated. Repaired. - North of Building 661, in utility pole storage area. Not excavated.OPWL PIPE DATA SUMMARY: P-4

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-043-M	7/20/83	7/20/90	SITE UTILITY PLAN (E-5)
15501-037	7/20/83	8/1/83	UTILITY LAYOUT (E-5)
23723	7/22/52	?	INDUSTRIAL WASTE FOR BUILDING NOS. 23 & 41, GENERAL PLAN & PROFILE
5703-002	5/17/52	5/1/53	INDUSTRIAL WASTE PLAN & PROFILE BUILDING 81 & 74
2-4181	3/31/59		UNDERGROUND UTILITIES LAYOUT ZONES G-2 & H-2
2-4182	3/31/59		UNDERGROUND UTILITIES LAYOUT ZONES G-3 & H-3
2-4182	3/31/59		UNDERGROUND UTILITIES LAYOUT ZONES G-3 & H-3
2-4181	3/31/59		UNDERGROUND UTILITIES LAYOUT ZONES G-2 & H-2
RF-BZ-21622-31-26	8/18/69	10/28/71	ADDITION & RENOVATION SITE PLAN - UTILITIES
RF-BZ-21622-32-27	8/18/69	10/28/71	ADDITION & RENOVATION SITE PLAN - UTILITIES
D-23723	8/13/52	7/6/72	INDUSTRIAL WASTE FOR BUILDINGS 23 & 41 PLAN & PROFILE
D-23723	8/13/52	7/6/72	INDUSTRIAL WASTE FOR BUILDINGS 23 & 41 PLAN & PROFILE
1-3549-207	5/19/52	5/22/56	INDUSTRIAL WASTE PLAN & PROFILE BUILDING 81 & 74

Comments

None

OPWL PIPE DATA SUMMARY: P-5

Location

Building or Area: Building 444
General Location: North of[9,10] and beneath[10] Building 444
Location - Features:

North	East	Elev	Feature
35928	19284.25		Building 444
35933	19284.25		elbow
35952	19300		elbow
36056	19300	6016.7	valve pit (intersection with P-4)

source:25838-X06, 25838-X07, and 23723

Physical Description

Configuration: 4-inch cast iron pipe[1,9,10]
2-, 3-, 4-, and 6-inch pipe[3]
Total Length: 1561 feet[1]
Outside Length: 175 feet[2]
152 feet[9]
OPWL Connections: P-4 (4-inch cast iron pipe) south of Building 442[9,10]

Past Usage and Current Status

Date of Installation: 1952[1]
Date of Abandonment: April 1981[1]
Current Status: Decontaminated, removed, and replaced with inspectable pipe[1]
Abandoned[2]
Portion of building was abandoned in place. Small portion was decontaminated first. Drawings indicate pipes could be removed or abandoned after August 1, 1978. Other drawings indicate to flush clean, seal, and abandon[3].
Waste Source: Building 444[9,10]

Release History

Known Releases: area

Entire pipeline outside of Building 444 identified on location map as of reported release[10]

Leak of 2.5 gph at 37 psig detected in 1971 pressure test[11].

Leak indications found at the following locations:

- In the ditch, north of Building 444 exclusion fence. Excavated and repaired.
- 8 ft inside the fence toward Building 444. Excavation revealed concrete casement. Not repaired.
- 6 ft north of Building 444. Not excavated.

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-052-M	7/20/83	7/20/90	SITE UTILITY PLAN (F-3)
15501-035	7/20/83	4/25/86	SITE UTILITY PLAN (E-3)
15501-009	1/30/67	10/2/68	UTILITY LAYOUT (E-3)
15501-041-M	7/20/85	7/20/90	SITE UTILITY PLAN (E-3)
23723	7/22/52	?	INDUSTRIAL WASTE FOR BUILDING NOS. 23 & 41, GENERAL PLAN & PROFILE

Comments

Reference 3 refers to drawing numbers 25838-X05 through 25838-X10, 25838-DX1, and 25838-D01 through 25838-D05.

OPWL PIPE DATA SUMMARY: P-6

Location

Building or Area: Building 881
General Location: Building 881 to valve vault west of Building 884[9,10]
Location - Features:

North	East	Elev	Feature
35447	20680	5995	Building 881
35447	20601	5998.35	point of known elevation
35447	20590	6001.9	process waste vent
35447	20560	6000.87	elbow
36030	20560	5999.29	manhole (intersection with P-4)
36191	20560	5995.6	lamphole (intersection with P-10)
36220	20560	5994.5	lamphole (see 3549-207E)
36231	20560	5994	manhole west of Building 884 (intersect with P-9 and P-11)

source: 15501-43, 15500-44, 3549-207E, and 25608-002-M

Physical Description

Configuration: 3-inch Saran-lined steel pipe inside 10-inch vitrified-clay pipe[JEG]

Total Length: 1300 feet[1]
865 feet[4]

Outside Length: 820 feet[2]
910 feet[9]

OPWL Connections:
P-4 (4-inch cast iron pipe) at valve west of Building 879[9,10]
P-9 (3-inch steel pipe) at valve vault west of Building 884[9,10]
P-10 (3-inch stainless-steel pipe) west of Building 884[9,10]
P-11 (3-inch ribbed hose inside 10-inch vitrified-clay pipe) at valve vault west of Building 884[9,10]
P-54 (3-inch stainless-steel pipe) at Building 881[9,10]

Past Usage and Current Status

Date of Installation:	1953[1,4]
Date of Abandonment:	December 1980[1] After 7/2/76[3]
Current Status:	Abandoned[1,2]
Waste Source:	Buildings 123, 441, 444, 865, 881, and 889[9,10]

Release History

Known Release: At intersection of P-6 with P-4, P-9, P-10, and P-11 and near Building 881[1]

South end of pipeline, valve vault west of Building 879, and valve vault west of Building 884 identified on location map as area of reported release[10]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-043-M	7/20/83	7/20/90	SITE UTILITY PLAN (E-5)
15501-037	7/20/83	8/1/83	UTILITY LAYOUT (E-5)
15501-054-M	7/20/83	7/20/90	SITE UTILITY PLAN (F-5)
20829-018	8/6/68		UTILITY LAYOUT VOID
2-4182	3/31/59		UNDERGROUND UTILITIES LAYOUT ZONES G-3 & H-3
25608-002-M-5	6/17/76	4/28/92	REPLACE PROCESS WASTE SYSTEM BUILDING 881 TO VALVE VAULT-1
25609-006-M-28	6/17/76	4/28/92	REPLACE PROCESS WASTE SYSTEM SITE PIPING
2-4181	3/31/59		UNDERGROUND UTILITIES LAYOUT ZONES G-2 & H-2
2-4182	3/31/59		UNDERGROUND UTILITIES LAYOUT ZONES G-3 & H-3
2-4181	3/31/59		UNDERGROUND UTILITIES LAYOUT ZONES G-2 & H-2
D-23723	8/13/52	7/6/72	INDUSTRIAL WASTE FOR BUILDINGS 23 & 41 PLAN & PROFILE
2-4180	3/31/59		UNDERGROUND UTILITIES LAYOUT ZONES G-1 & H-1
1-3549-207	5/19/52	5/22/56	INDUSTRIAL WASTE PLAN & PROFILE BUILDING 81 & 74
D-23723	8/13/52	7/6/72	INDUSTRIAL WASTE FOR BUILDINGS 23 & 41 PLAN & PROFILE
2-4180	3/31/59		UNDERGROUND UTILITIES LAYOUT ZONES G-1 & H-1
5703-002	5/17/52	5/1/53	INDUSTRIAL WASTE PLAN & PROFILE BUILDING 81 & 74
23723	7/22/52	?	INDUSTRIAL WASTE FOR BUILDING NOS. 23 & 41, GENERAL PLAN & PROFILE
2-4183	3/31/59		UNDERGROUND UTILITIES LAYOUT ZONES G-4 & H-4
5703-002	5/19/52	5/4/53	INDUSTRIAL WASTE PLAN & PROFILE BUILDING 81 & 74

Comments

Reference 3 refers to drawing numbers 25609-X08 and 25609-X09.

Unclear if Section 5 identified in 1971 pressure test[11] includes P-6 (see comments for P-11).

OPWL PIPE DATA SUMMARY: P-7

Location

Building or Area: Buildings 881 and 887
General Location: South of[9,10] and beneath[10] Building 881 to Building 887
Location - Features:

North	East	Elev	Feature
35208.67	20745.7	5962.1	Building 881
35137.67	20745.7	5961	elbow
35137.67	20732	5960.75	Building 887

source: 15501-54 , 25609-X08, 25609-1, 2-4180

Physical Description

Configuration: 4-inch stainless-steel pipe[1,3b,9,10]
2- and 4-inch cast iron and stainless steel[3a]
Total Length: 440 feet[1]
Outside Length: Approximately 85 feet[9]
OPWL Connections: T-24 and T-32 at Building 887[10]

Past Usage and Current Status

Date of Installation: 1952[1]
Date of Abandonment: December 1980[1]
After 7/2/76[3a]
Current Status: Abandoned portion outside building[3a]
Double contained and converted to the New Transfer System under authorization #365556[3b]
Waste Source: Building 881[9,10]

Release History

Known Releases: None[1]
Entire pipeline identified on location map as area of reported release[10]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-054-M	7/20/83	7/20/90	SITE UTILITY PLAN (F-5)
25609-X09-22	6/17/76		REPLACE PROCESS WASTE SYSTEM PIPING REMOVAL
25609-014-M-36	6/17/76	4/28/92	REPLACE PROCESS WASTE SYSTEM PIPING
25609-013-M-35	6/17/76	4/28/92	REPLACE PROCESS WASTE SYSTEM SITE PIPING
25609-X08-21	6/17/76		REPLACE PROCESS WASTE SYSTEM PIPING REMOVAL
25609-014-01C	5/13/92		REPLACE PROCESS WASTE SYSTEM PIPING
2-4180	3/31/59		UNDERGROUND UTILITIES LAYOUT ZONES G-1 & H-1
2-4180	3/31/59		UNDERGROUND UTILITIES LAYOUT ZONES G-1 & H-1
25609-013-02C-21	5/13/92		REPLACE PROCESS WASTE SYSTEM PIPING REMOVAL
25609-013-01C	5/13/92		REPLACE PROCESS WASTE SYSTEM PIPING

Comments

Reference 3a refers to drawing numbers 25609-X04 through 25609-X06 and 25609-X08. Reference 3b refers to drawing number 15507-4

OPWL PIPE DATA SUMMARY: P-8

Location

Building or Area:	Buildings 881 and 887
General Location:	South of and beneath Building 881[10] to Building 887
Location - Features:	

can find no record of this line

Physical Description

Configuration:	N/A
Total Length:	N/A
Outside Length:	N/A
OPWL Connections:	N/A

Past Usage and Current Status

Date of Installation:	N/A
Date of Abandonment:	N/A
Current Status:	N/A
Waste Source:	N/A

Release History

Known Releases: N/A

Reference Drawings

N/A

Comments

N/A = Not Applicable.

P-8 is not a valid location according to Building Personnel and Engineering Drawings.

Utility drawing[9] indicates no pipe matching the description of P-8.

OPWL PIPE DATA SUMMARY: P-9

Location

Building or Area: Building 883
General Location: West of[9,10] and beneath[10] Building 883 to valve vault west of Building 884[9,10]

Location - Features:

North	East	Elev	Feature
35923.83	20672		Building 883
35923.83	20586		elbow east of valve vault
35944	20567.5		elbow north of valve vault
36226	20567.5		elbow east of P-6/P-9/P-11 intersection
36231	20560	5994	manhole west of Bldg 884 (intersection with P-6 and P-11)

source:15501-43

Physical Description

Configuration: 3-inch steel[1,4,9,10]
1.5-inch stainless steel[3]

Total Length: 504 feet[1,4]
40 feet[3]

Outside Length: 390 feet[2]
410 feet[9]

OPWL Connections: P-6 (3-inch Saran-lined steel pipe inside a 10-inch vitrified-clay pipe) valve vault west of Building 884[9,10]
P-11 (3-inch Ribbed Hose inside a 10 inch vitrified clay pipe) valve vault west of 884[9,10]
T-25 and T-26 at Building 883[10]

Past Usage and Current Status

Date of Installation: 1957[1,4]
Date of Abandonment: March 1984[1]
Current Status: Decontaminated, removed, and replaced with inspectable pipe[1]
Abandoned[2]
Waste Source: Building 883[9,10]

Release History

Known Releases: At intersection of P-9 with P-6[1,10]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-043-M	7/20/83	7/20/90	SITE UTILITY PLAN (E-5)
15501-037	7/20/83	8/1/83	UTILITY LAYOUT (E-5)
25609-006-M-28	6/17/76	4/28/92	REPLACE PROCESS WASTE SYSTEM SITE PIPING
2-4181	3/31/59		UNDERGROUND UTILITIES LAYOUT ZONES G-2 & H-2
2-4181	3/31/59		UNDERGROUND UTILITIES LAYOUT ZONES G-2 & H-2
2-4182	3/31/59		UNDERGROUND UTILITIES LAYOUT ZONES G-3 & H-3
2-4182	3/31/59		UNDERGROUND UTILITIES LAYOUT ZONES G-3 & H-3
25608-003-M-6	6/17/76	4/28/92	REPLACE PROCESS WASTE SYSTEM BUILDING 883 TO VALVE VAULT-2
20829-018	8/6/68		UTILITY LAYOUT VOID

Comments

Reference 3 refers to drawing number 25609-X07.

OPWL PIPE DATA SUMMARY: P-10

Location

Building or Area: Buildings 865 and 889
General Location: North of Building 889 and west of[9,10] and beneath[10] Building 865
Location - Features:

North	East	Elev	Feature
36191	20560	5995.6	lamphole (intersect with P-6)
36191	20677.4		cleanout (intersect with P-10 spur)
36191	20743		manhole north of Building 889
36191	20880		elbow near valve vault 5
36125.5	20880		elbow near valve vault west of Building 865
36125.5	20970		Building 865
Spur			
36191	20677.4		cleanout (intersect with P-10)
36134	20677.4		tank valve west of Building 889 (T-40)
36134	20722		Building 889

source: 15501-43, 20829-19

Physical Description

Configuration: 3 inch stainless steel[1,4,9,10]
Total Length: 1190 feet[1]
550 feet[4]
560 feet[2]
Outside Length: Approximately 455 feet[9]
OPWL Connections: P-6 (3-inch Saran-lined steel pipe inside a 10-inch vitrified-clay pipe) west of Building 884[9,10]
T-23 at Building 865[10]
T-28 at Building 889[10]
T-40 west of Building 889

Past Usage and Current Status

Date of Installation:	1968[1,4]
Date of Abandonment:	May 1982[1]
Current Status:	Decontaminated, removed, and replaced with inspectable pipe[1] Abandoned[2] All pipe beneath building capped and abandoned after 8/21/81[3]
Waste Source:	Buildings 865 and 889[9,10]

Release History

Known Releases:	At intersection of P-10 with P-6[1] West end of pipeline identified on location map as area of reported release[10]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-043-M	7/20/83	7/20/90	SITE UTILITY PLAN (E-5)
15501-037	7/20/83	8/1/83	UTILITY LAYOUT (E-5)
26378-X05-24	8/21/81		REPLACE PROCESS WASTE SYSTEM ABANDONMENT & REMOVAL PLAN
26378-005-29	8/21/81	1/20/87	REPLACE PROCESS WASTE SYSTEM EQUIPMENT & PIPING BUILDING 866
26378-X04-23	8/21/81		REPLACE PROCESS WASTE SYSTEM ABANDONMENT & REMOVAL PLAN
26378-001-25	8/21/81	1/20/87	REPLACE PROCESS WASTE SYSTEM PLAN & PROFILE
26378-X03-22	8/21/81		REPLACE PROCESS WASTE SYSTEM REMOVAL PLAN
26378-X01-20	8/21/81		REPLACE PROCESS WASTE SYSTEM REMOVAL PLANS & SECTIONS
20829-018	8/6/68		UTILITY LAYOUT VOID
26378-X02-21	8/21/81		REPLACE PROCESS WASTE SYSTEM REMOVAL PLAN

Comments

Reference 3 refers to drawing numbers 26378-X01 through 26378-X05.

OPWL PIPE DATA SUMMARY: P-11

Location

Building or Area: Building 884
General Location: West of Building 884
Location - Features:

North	East	Elev	Feature
36231	20560	5994	manhole west of Bldg 884 (intersect. with P-6 & P-9)
36410	20560	5991.5	P-11/P-12 intersection

source: 15501-30, 15501-43 and 3549-207E

Physical Description

Configuration: 3-inch Saran-lined steel inside 10-inch vitrified-clay pipe (original)
3-inch ribbed hose inside 10-inch vitrified-clay pipe[JEG]

Total Length: 165 feet[1,2,4]
Outside Length: 175 feet[9]
OPWL Connections: P-6 (3-inch Saran lined steel pipe inside a 10-inch vitrified-clay pipe) at valve vault west of Building 884[9,10]
P-9 (3-inch steel pipe) at valve vault west of Building 884[9,10]
P-12 (3-inch Saran-lined steel inside 10-inch vitrified-clay pipe) northwest of Building 884
P-13 (3-inch ribbed hose inside 4-inch fiberglass pipe) northwest of Building 884[1,4]

Past Usage and Current Status

Date of Installation: 1952 (original), 1975 (upgrade)[1]

Date of Abandonment: March 1984[1]
Current Status: Abandoned[1,2]
Removed 3-inch portion of Saran-lined steel in 1975 and replaced it with 3-inch ribbed hose[4]
Waste Source: Buildings 123, 441, 444, 865, 881, 883, and 889[9,10]

Release History

Known Releases:

At intersection of P-11 with P-6[1]
Both ends of pipeline identified on location map as area of reported release[10]

Leak of 27 gph @ 20 psig detected in 1971 pressure test[11]. Although the line is inside of another protective pipe, the presence of nitrous oxide indicates a leak north of valve pit west of Building 883(?).

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-030-M	7/20/83	7/20/90	SITE UTILITY PLAN (D-5)
15501-043-M	7/20/83	7/20/90	SITE UTILITY PLAN (E-5)
15501-037	7/20/83	8/1/83	UTILITY LAYOUT (E-5)
1-3549-207	5/19/52	5/22/56	INDUSTRIAL WASTE PLAN & PROFILE BUILDING 81 & 74

Comments

Drawings[9,10] do not indicate a fiberglass pipe inside the vitrified-clay pipe as cited by other references.

Unclear if 1971 pressure test[11] reference to valve pit "west of Building 883" should read "west of Building 884," which is the description for Section 5 provided in the section identification table. It is assumed that the reference is to Building 884, which implies the leak was in P-11, rather than in P-6 as implied by the Building 883 citation. The protective pipe cited further suggests a reference to P-11, as no reference cited a protective pipe associated with P-6.

OPWL PIPE DATA SUMMARY: P-12

Location

Building or Area:	Building 708
General Location:	West of Building 708
Location - Features:	

North	East	Elev	Feature
36410	20560	5991.5	P-12/P-11 intersection north of Central Ave.
36910	20560	5986.3	valve vault west of Building 707 "(intersection with P-14"

Physical Description

Configuration:	3-inch Saran-lined steel pipe inside 10 inch vitrified-clay pipe[1,4]
Total Length:	573 feet[1,2,4]
Outside Length:	500 feet[10]
OPWL Connections:	P-11 (3-inch ribbed hose inside 10-inch vitrified-clay pipe) northwest of Building 884[10]
valve vault	P-14 (3-inch Saran-lined steel pipe inside 10-inch vitrified-clay pipe) at west of Building 707[10]

Past Usage and Current Status

Date of Installation:	1952[1,4]
Date of Abandonment:	1975[4]
Current Status:	Abandoned[1,2,4]
Waste Source:	Buildings 123, 441, 444, 865, 881, 883, and 889[10]

Release History

Known Releases:

At intersection of P-12 with P-11[1]
Valve vault #7 leak on 4/4/83[7]
Entire pipeline identified on location map as area of reported release[10]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-030-M	7/20/83	7/20/90	SITE UTILITY PLAN (D-5)
2-4183	3/31/59		UNDERGROUND UTILITIES LAYOUT ZONES G-4 & H-4
5703-002	5/19/52	5/4/53	INDUSTRIAL WASTE PLAN & PROFILE BUILDING 81 & 74
2-4182	3/31/59		UNDERGROUND UTILITIES LAYOUT ZONES G-3 & H-3

Comments

Acid and steam destroyed vitrified clay pipe (outer shell); replaced by P-13[1].
Closure plan[10] flips P-12 and P-13 designations on the OPWL Location Map (Plate I).
Unclear if Section 5 identified in 1971 pressure test[11] includes P-12. (See comments for P-13).

OPWL PIPE DATA SUMMARY: P-13

Location

Building or Area:		Building 708	
General Location:		West of Building 708	
Location - Features:			
North	East	Elev	Feature
36410	20560	5991.5	P-11/P-13 intersection north of Central Ave.
36910	20560	5986.3	valve vault west of Building 707 "(intersection with P-15)"
36416	20556		elbow
36904	20556		elbow

source: 15501-30 and 3549-207E

Physical Description

Configuration: 3-inch ribbed hose inside 4-inch fiberglass pipe[1]
3-inch ribbed hose inside 4-inch fiberglass reinforced epoxy[4]
3-inch fiberglass inside 4-inch fiberglass pipe[9,10]

Total Length: 523 feet[1,2,4]

OPWL Connections: P-11 (3-inch ribbed hose inside 10-inch vitrified-clay pipe) northwest of Building 884[9,10]
P-15 (3-inch stainless-steel pipe) at valve vault west of Building 707

Past Usage and Current Status

Date of Installation: 1975[1,4]
Date of Abandonment: March 1984[1]
Current Status: Abandoned[1,2]
Waste Source: Buildings 123, 441, 444, 865, 881, 883, and 889[9,10]

Release History

Known Releases: At intersection of P-13 with P-12[1]
Valve vault #7 leaked on 4/4/83[8]
Entire pipeline identified on location map as area of reported release[10]
Leak of 27 gph at 20 psig detected in 1971 pressure test[11]. Although the line is inside of another protective pipe, the presence of nitrous oxide indicates a leak south of the lamphole near Eighth and Sage Streets.

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-030-M	7/20/83	7/20/90	SITE UTILITY PLAN (D-5)
1-3549-207	5/19/52	5/22/56	INDUSTRIAL WASTE PLAN & PROFILE BUILDING 81 & 74
5703-002	5/19/52	5/4/53	INDUSTRIAL WASTE PLAN & PROFILE BUILDING 81 & 74
2-4183	3/31/59		UNDERGROUND UTILITIES LAYOUT ZONES G-4 & H-4
5703-002	5/17/52	5/1/53	INDUSTRIAL WASTE PLAN & PROFILE BUILDING 81 & 74
2-4182	3/31/59		UNDERGROUND UTILITIES LAYOUT ZONES G-3 & H-3

Comments

P-13 replaced P-12 which was destroyed by acid and steam(1).
Pipes P-13 and P-12 are the same length and immediately adjacent to each other(2).
Closure plan(10) flips P-12 and P-13 designations on the OPWL Location Map (Plate I).
Reference to 1971 pressure test(11) is assumed to refer to P-13; it is possible that this refers to P-12.

OPWL PIPE DATA SUMMARY: P-14

Location

Building or Area: Building 777

General Location: Building 777, beneath Buildings 778 and 707, to valve vault west of Building 707[9,10]

Location - Features:

North	East	Elev	Feature
36910	20560		valve vault west of building 707 "(intersection with P-12)
37340	20990		point under Building 778
37384	20990		Building 777

source: Dow dwg 1-3549-207E

Physical Description

Configuration: 3 inch Saran-lined steel pipe inside 10 inch vitrified clay pipe[1,4, and Drawing 3549-207E)

Total Length: 625 feet[1,2]
942 feet[4]

Outside Length: 648 feet[9]

OPWL Connections: P-12 (3-inch Saran-lined steel pipe inside 10-inch vitrified-clay pipe) at valve vault west of Building 707
P-21 (3-inch stainless-steel pipe) at valve vault southwest of Building 703[1,4,9,10]

Past Usage and Current Status

Date of Installation: 1952[1,4]

Date of Abandonment: 1968[1,4]

Current Status: Decontaminated, removed, and replaced with inspectable pipe[1]
Abandoned[2,9,10]
Abandoned - portions may have been removed for construction of Buildings 707 and 777[4]

Waste Source: Buildings 123, 441, 444, 881, and 883[4]
Buildings 123, 441, 444, 865, 881, 883, and 889[9,10]

Release History

Known Releases:

None[1]

Acid leaks at intersection of P-14 with P-12[4]

Some soil has been infiltrated in the immediate vicinity of the original location[8]

Entire pipeline identified on location map as area of reported release[10]

Release resulting from a broken flange during excavation of Building 777 in 1962

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-021-M	7/20/83	5/14/90	SITE UTILITY PLAN (C-5)
15501-030-M	7/20/83	7/20/90	SITE UTILITY PLAN (D-5)
2-4184	3/31/59		UNDERGROUND UTILITIES LAYOUT ZONES G-5 & H-5
2-4183	3/31/59		UNDERGROUND UTILITIES LAYOUT ZONES G-3 & H-3
14602-001			UTILITY PLAN BUILDING 79
5703-002	5/17/52	5/1/53	INDUSTRIAL WASTE PLAN & PROFILE BUILDING 81 & 74
25845-X12-S-12	12/15/77		REPLACE UNINSPECTABLE WASTE SYSTEM OUTSIDE PIPING ABANDON PLAN
2-4184	3/31/59		UNDRGROUND UTILITIES LAYOUT ZONES G-5 & H-5
5703-002	5/19/52	5/4/53	INDUSTRIAL WASTE PLAN & PROFILE BUILDING 81 & 74
1-3549-207	5/19/52	5/22/56	INDUSTRIAL WASTE PLAN & PROFILE BUILDING 81 & 74
2-4183	3/31/59		UNDERGROUND UTILITIES LAYOUT ZONES G-4 & H-4
8836-003	12/20/59	3/21/60	GENERAL SITE PLAN & UTILITY PLAN

Comments

OPWL PIPE DATA SUMMARY: P-15

Location

Building or Area: Building 707
General Location: North and west of Building 707[9,10]
Location - Features:

North	East	Elev	Feature
36910	20560		valve vault west of building 707 (intersection with P-13)
37071	20560		manhole west of Building 707 (intersect with P-16)
37075	20561		manhole west of Building 707
37282	20561		manhole northwest of Building 707 (P-15/P-19/P-20)
37284	20562		manhole northwest of Building 707 (P-15/P-19/P-20)
37284	20934		manhole northeast of Building 707 (P-15/P-19/P-20)

source 15501-20 and 15501-30

Physical Description

Configuration: 3-inch stainless-steel pipe[1,4]
3-inch stainless-steel pipe inside 10-inch vitrified-clay pipe

Total Length: 878 feet[1,4]
850 feet[2]

Outside Length: 785 feet[9]

OPWL Connections: P-13 (3-inch fiberglass pipe inside 4-inch fiberglass pipe) at valve vault west of Building 707[9,10]
P-16 (3-inch polyvinyl chloride pipe) at valve vault east of Building 528[9,10]
P-19 (3-inch stainless-steel pipe) at valve vault northeast of Building 707[9,10]
P-20 (3-inch stainless-steel pipe) at valve vault northeast of Building 707[9,10]

Past Usage and Current Status

Date of Installation: 1968[1,4]
Date of Abandonment: March 1984[1]
Current Status: Abandoned[1,2]
Waste Source: Buildings 123, 444, 559, 881, 883, and 889[4]
Buildings 123, 441, 444, 559, (561?), 865, 881, 883, and 889[9,10]

Release History

Known Releases: None[1]

Leak of 27 gph at 20 psig detected in 1971 pressure test[11]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-021-M	7/20/83	5/14/90	SITE UTILITY PLAN (C-5)
15501-030-M	7/20/83	7/20/90	SITE UTILITY PLAN (D-5)

Comments

Drawings[9,10] indicate P-15 changes from 3 inch Saran-lined steel pipe inside 10 inch vitrified clay to 3 inch stainless-steel pipe as it crosses from Area D-5 to C-5, with no clear indication of where the transition occurs.

OPWL PIPE DATA SUMMARY: P-16

Location

Building or Area: Building 528
General Location: Building 528 to valve vault east of Building 528[3,9,10]
Location - Features:

North	East	Elev	Feature
37072.2	20445.7		Building 528 (located southeast of Building 559)
37072.2	20560		manhole west of building 707 (intersect with P-15)

source: 15501-20 and 15501-21

Physical Description

Configuration: 3-inch polyvinyl chloride pipe[1,3,4,9,10]

Total Length: 170 feet[1,4]
165 feet[2]
130 feet[3]
Outside Length: 110 feet[9]
OPWL Connections: T-7 at Building 528[10]
P-15 (3 inch stainless-steel pipe) at valve vault east of Building 528[9,10]

Past Usage and Current Status

Date of Installation: 1968[1,4]
Date of Abandonment: July 1982[1]
Current Status: Abandoned[1,2]
Waste Source: Building 559[3,9,10]

Release History

Known Releases: At intersection of P-16 with T-7[1]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-020-M	7/20/83	7/20/90	SITE UTILITY PLAN (C-4)
25609-001-23	6/17/76	9/6/77	REPLACE PROCESS WASTE SYSTEM-SITE PIPING
25608-001-4	6/17/76	9/16/77	REPLACE PROCESS WASTE SYSTEM BUILDING 559 TO VALVE VAULT10

Comments

Reference 3 refers to drawing number 25609-1.

OPWL PIPE DATA SUMMARY: P-17

Location

Building or Area:		Building 559	
General Location:		East of[9,10] and beneath[10] Building 559	
Location - Features:			

North	East	Elev	Feature
37216.5	20408		east side of Building 559
37216.5	20412		elbow
37124.5	20412	5991.17	manhole southeast of Building 559 (intersects with P-17 spur)
37084	20412	5990.77	north side of Building 528 (T-7)
Spur			
37124.5	20384	5991.73	southeast corner of Building 559
37124.5	20412		manhole southeast of Building 559 (intersects with P-17)

source: 15501-20, 25609-X01,25540-12

Physical Description

Configuration:	4-inch glass pipe[1,4] 3-inch glass, 4-inch polyvinyl chloride pipe inside 6-inch glass pipe, and 4-inch stainless-steel pipe[3] 4-inch polyvinyl chloride and polyethylene pipe[9,10]
Total Length:	1130 feet[1]
Outside Length:	135 feet[4] 160 feet[9]
OPWL Connections:	T-7 at Building 528[10]

Past Usage and Current Status

Date of Installation:	1968[1,4]
Date of Abandonment:	July 1982[1] After 7/2/76 (date of drawing)[3]
Current Status:	Abandoned[1] Abandoned; removed piping above floor slab[3]
Waste Source:	Building 559[9,10]

Release History

Known Releases: At P-17, under Building 559[1]
Entire area beneath Building 559 identified on location map as area of reported release[10]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-020-M	7/20/83	7/20/90	SITE UTILITY PLAN (C-4)
25609-X02-15	6/17/76		REPLACE PROCESS WASTE SYSTEM-PIPING REMOVAL
25609-001-23	6/17/76	9/6/77	REPLACE PROCESS WASTE SYSTEM-SITE PIPING
25540-005-5	5/15/75		REPLACE UNINSPECTABLE PROCESS WASTE SYSTEM BUILDING 559 SECTOR 2 ABAN PIPING
24386-002-2	10/15/73	1/23/74	PROCESS LINE REPLACEMENT LAYOUT (CONT'D)
25540-006-6	5/15/79		REPLACE UNINSPECTABLE PROCESS WASTE SYSTEM BUILDING 559 SECTOR 3 ABAN PIPING
25609-X03-16	6/17/76		REPLACE PROCESS WASTE SYSTEM-PIPING REMOVAL
24386-001-1	10/15/73	1/23/79	PROCESS LINE REPLACEMENT LAYOUT
25609-X01-14	6/17/76		REPLACE PROCESS WASTE SYSTEM PIPING REMOVAL
25540-004-4	5/15/75		REPLACE UNINSPECTABLE PROCESS WASTE SYSTEM BUILDING 559 SECTION 1 ABANDON PIPING
25540-012-12	5/15/75	5/22/75	REPLACE UNINSPECTABLE PROCESS WASTE SYSTEM BUILDING 559/561 ABANDONMENT & NEW PIPING
25540-007-7	5/15/75		REPLACE UNINSPECTABLE PROCESS WASTE SYSTEM BUILDING 559...
39894-215	6/25/92		REPAIR SUMP FIBERGLASS LINER CYL DETAILS & GENERAL NOTES
38551-206-9	7/22/88		SECONDARY CONTAINMENT UPGRADES
19527-001-6	9/25/70	11/1/71	SITE PLAN - UTILITIES
25608-001-4	6/17/76	9/16/77	REPLACE PROCESS WASTE SYSTEM BUILDING 559 TO VALVE VAULT10
25609-004-26	6/17/76	12/20/89	REPLACE PROCESS WASTE SYSTEM PIPING DETAILS
25609-002-24	6/17/76	9/16/77	REPLACE PROCESS WASTE SYSTEM PIPING-WEST HALF
25609-001-23	6/17/76	9/16/77	REPLACE PROCESS WASTE SYSTEM SITE PIPING
25609-005-27	6/17/76	9/16/77	REPLACE PROCESS WASTE SYSTEM PIPING DETAILS
25609-003-25	6/17/76	9/16/77	REPLACE PROCESS WASTE SYSTEM PIPING-EAST HALF
19527-001-6	9/25/70	11/1/71	SITE PLAN - UTILITIES

Comments

Reference 3 refers to drawing numbers 25609-X01 through 25609-X03, 24386-1, and 24386-2.

Area C-4 map of the Closure Plan[10] does not indicate an area of reported release under Building 559 as indicated on the OPWL Location Map (Plate I).

OPWL PIPE DATA SUMMARY: P-18

Location

Building or Area: Building 559
General Location: West of Building 559
Location - Features: N/A

Physical Description

N/A

Past Usage and Current Status

N/A

Release History

N/A

Reference Drawings

N/A

Comments

N/A = Not Applicable
P-18 appears to be an invalid pipeline designation

OPWL PIPE DATA SUMMARY: P-19

Location

Building or Area: Building 707
General Location: East of[9,10] and beneath[10] Building 707
Location - Features:

North	East	Elev	Feature
37145	20911.5		Building 731
37280	20911.5		elbow
37280	20930		elbow
37284	20934		manhole northeast of Building 707

source: 15501-21 and 15501-30

Physical Description

Configuration: 3 inch stainless-steel pipe[1,3,4,9,10]

Total Length: 603 feet[1]
980 feet[3]
186 feet[4]

Outside Length: 154 feet[2]
147 feet[9]

OPWL Connections: P-15 (3-inch stainless-steel pipe) at valve vault northeast of Building 707[9,10]
P-20 (3-inch stainless-steel pipe) at valve vault northeast of Building 707[9,10]
T-11 and T-30 at Building 731[10]

Past Usage and Current Status

Date of Installation: 1968[1,4]

Date of Abandonment: March 1984[1]
After 12/7/77[3]

Current Status: Abandoned[1,2]
Removed P-19 between Buildings 707 and 731; abandoned all of P-19 inside building[3]

Waste Source: Building 707

Release History

Known Releases:	None[1]
identified	Buildings 707 and 731 and valve vault northeast of Building 707 on location map as area of reported release[10]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-021-M	7/20/83	5/14/90	SITE UTILITY PLAN (C-5)
15501-030-M	7/20/83	7/20/90	SITE UTILITY PLAN (D-5)
25788-X07-7	12/7/77		REPLACE WASTE COLLECT SYSTEM BUILDING 707 REMOVAL PLAN PART D, 1ST FLOOR
25788-X05-5	12/7/77		REPLACE WASTE COLLECT SYSTEM BUILDING 707 REMOVAL PLAN PART B, 1ST FLOOR
25788-X06-6	12/7/77		REPLACE WASTE COLLECT SYSTEM BUILDING 707 REMOVAL PLAN PART C, 1ST FLOOR

Comments

Reference 3 refers to drawing numbers 25788-X05 through 25788-X07.

OPWL PIPE DATA SUMMARY: P-20

Location

Building or Area: Building 777

General Location: South of[9,10] and beneath[10] Building 777 to valve vault southwest of Building 703[9,10]

Location - Features:

North	East	Elev	Feature
37284	20934		manhole northeast of Building 707
37293	20944		elbow
37293	21058		elbow
37408	21058		intersection with P-20 spur
37682	21058		point under Building 777
37682	20990	5980.2	elbow
37728	20990	5979.8	valve vault southwest of Building 703
P-20.1 (SPUR)			
37408	21058		intersection with P-20
37408	21106		Building 729

source: 15501-13, 15501-21, 3549-207E, 15507-5, and 25845-X12S

Physical Description

Configuration: 3-inch stainless-steel pipe[1,3,9,10]

Total Length: 499 feet[1]
480 feet[2]
455 feet[3]

Outside Length: 475 feet[9]

OPWL Connections: P-15 (3-inch stainless-steel pipe) at valve vault northeast of Building 707[9,10]
P-19 (3-inch stainless-steel pipe) at valve vault northeast of Building 707[9,10]
P-21 (3-inch stainless-steel pipe) at valve vault southwest of Building 703[9,10]
P-36 (3 inch PVC and stainless-steel pipe)

Past Usage and Current Status

Date of Installation: 1968[1,3]

Date of Abandonment: March 1984[1]

Current Status: Abandoned[1,2]

Waste Source: Buildings 123, 444, 559, 707, 729, 865, 881, 883, 889[3]
Buildings 123, 441, 444, 559, (561?), 707, 865, 881, 883, and 889[9,10]

Release History

Known Releases:

At intersection of P-20 with P-21[1]
Valve vault southwest of Building 703 identified on location map as area of reported release[10]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-013-M	7/20/83	7/20/90	SITE UTILITY PLAN (B-5)
15501-021-M	7/20/83	5/14/90	SITE UTILITY PLAN (C-5)
15507-005			PROCESS WASTE LAYOUT ZONE B-5
5703-002	5/17/52	5/1/53	INDUSTRIAL WASTE PLAN & PROFILE BUILDING 81 & 74
25845-X12-S-12	12/15/77		REPLACE UNINSPECTABLE WASTE SYSTEM OUTSIDE PIPING ABANDONMENT PLAN
14267-009	10/6/69		RELOCATION OF PROCESS WASTE LINES AT NEW COOLING TOWER SITE
15507-002	11/9/73		PROCESS WASTE LAYOUT ZONE B-5
25845-X07-S	12/15/77		REPLACE UNINSPECTABLE PROCESS WASTE SYSTEM PIPING ABANDONMENT PLAN DETAILS BUILDING 777
14262-009-105	1/20/66		PLUTONIUM AREA UNDERGROUND PIPING PLAN, SECTION & DETAILS
14602-001			UTILITY PLAN BUILDING 79
8836-003	12/20/59	3/21/60	GENERAL SITE PLAN & UTILITY PLAN
1-3549-207	5/19/52	5/22/56	INDUSTRIAL WASTE PLAN & PROFILE BUILDING 81 & 74

Comments

Reference 3 refers to drawing numbers 25845-X125 and 25845-X085.

Utility drawing[9] suggests that part of P-20 was removed for construction of the new east wing of Building 778.

Closure plan[10] indicates a branch of P-20 to Building 729, which is not indicated on the utility drawings[9].

OPWL PIPE DATA SUMMARY: P-20.1 (Spur)

Location

Building or Area: Building 729
General Location: West side of Building 729
Location - Features:

North	East	Elev	Feature
37408	21058		intersection with P-20
37408	21106		Building 729

source: 15501-13, 15501-21, 3549-207E, 15507-5, and 25845-X12S

Physical Description

Configuration: 1-inch cast iron or black iron pipe
Total Length: 45 feet
Outside Length: 45 feet
OPWL Connections: P-20 (3-inch stainless-steel pipe) west of Building 729

Past Usage and Current Status

Date of Installation: mid 1960's
Date of Abandonment: 1977
Current Status: Abandoned
Waste Source: Building 729

Release History

Known Releases:

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
25845-X12-S-12	12/15/77		REPLACE UNINSPECTABLE WASTE SYSTEM OUTSIDE PIPING ABANDONMENT PLAN
25845-X08-S	12/15/77		REPLACE UNINSPECTABLE PROCESS WASTE SYSTEM PIPING ABANDONMENT PLAN

Comments

None

OPWL PIPE DATA SUMMARY: P-21

Location

Building or Area: Building 774
General Location: South of Building 774 to valve vault southwest of Building 703[9,10]
Location - Features:

North	East	Elev	Feature
37736	20990	5980	valve vault southeast of Building 703
37924	20990	5978.4	elbow
37936	20977		elbow
37783	20977		elbow
37783	20968		elbow
38023	20968		elbow
38023	20971		Building 774

source: 15501-13 and 15507-5

NOTE ON ORIGINAL OPWL ALIGNMENTS
originally P-21 followed a course parallel and two feet to the east of the southern reach of P-34. This line had the following coordinates:

37924	20990	5978.4	intersection with P-21 line described above
37974.71	20990	5978.1	point of known elevation
38065	20990	5960.3	south end of original Building 774

source:3549-207E

Physical Description

Configuration: 3 inch stainless-steel pipe[1,4,9,10]
Total Length: 386 feet[1]
185 feet[2]
Outside Length: 310 feet[9]

OPWL Connections:	P-14 (3-inch Saran lined steel pipe inside a 10-inch vitrified-clay pipe) P-20 (3-inch stainless-steel pipe) at valve vault southwest of Building 703[9,10] P-36 (3-inch stainless-steel pipe) at valve vault southwest of Building 703[9,10] P-58 (3-inch black iron pipe) [dwg 14267-9] T-15 and T-17 at Building 774[10]

Past Usage and Current Status

Date of Installation:	1952[1,4]
Date of Abandonment:	March 1984[1]
Current Status:	Abandoned[1]
Waste Source:	All buildings except Building 771[4] Buildings 123, 441, 444, 559, (561?), 707, 865, 881, 883 and 889[9,10]

Release History

Known Releases:	At intersection of P-21 with P-20[10]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-013-M	7/20/83	7/20/90	SITE UTILITY PLAN (B-5)
8836-003	12/20/59	3/21/60	GENERAL SITE PLAN & UTILITY PLAN
1-3549-207	5/19/52	5/22/56	INDUSTRIAL WASTE PLAN & PROFILE BUILDING 81 & 74
14262-009-105	1/20/66		PLUTONIUM AREA UNDERGROUND PIPING PLAN, SECTION & DETAILS
14267-009	10/6/69		RELOCATION OF PROCESS WASTE LINES AT NEW COOLING TOWER SITE
1-3763-207	6/5/56		FACILITY 207, PIPING PLAN, WASTE DISCHARGE
5703-002	5/17/52	5/1/53	INDUSTRIAL WASTE PLAN & PROFILE BUILDING 81 & 74

Comments

None

OPWL PIPE DATA SUMMARY: P-22

Location

Building or Area:	Building 771
General Location:	North of[9,10] and beneath[10] Building 771
Location - Features:	

North	East	Elev	Feature
38130	20588		Building 771
38175	20588		elbow
38190	20604		elbow
38204	20604		Building 728 (T-8)

source: 15501-13

Physical Description

Configuration:	6-inch cast iron pipe[1,3,4,9,10]
Total Length:	1205 feet[1] 1335 feet[3] 85 feet[4]
Outside Length:	83 feet[9]
OPWL Connections:	T-8 at Building 728[10] P-24 (6-inch cast iron pipe) north of Building 771

Past Usage and Current Status

Date of Installation:	1952
Date of Abandonment:	May 1982[1]
Current Status:	Decontaminated, removed, and replaced with inspectable pipe[1] Drawings dated 12/15/72 (as builts) indicate some lines had been removed[3]
Waste Source:	Building 771[9,10]

Release History

Known Releases:	At intersection of P-22 with P-23 and P-24 and at T-8[1] T-8 identified on location map area of reported release[10]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-013-M	7/20/83	7/20/90	SITE UTILITY PLAN (B-5)
2-4185	3/31/59		UNDERGROUND UTILITIES LAYOUT ZONES G-6, G-7, H-6 & H-7
14262-009-105	1/20/66		PLUTONIUM AREA UNDERGROUND PIPING PLAN, SECTION & DETAILS
14267-009	10/6/69		RELOCATION OF PROCESS WASTE LINES AT NEW COOLING TOWER SITE

Comments

None

OPWL PIPE DATA SUMMARY: P-23

Location

Building or Area: Building 771
General Location: North and west of Building 771[9,10]
Location - Features:

North	East	Elev	Feature
37971.25	20536.5		Building 771
37971.25	20455		elbow
38153	20455		elbow
38207	20504		elbow
38207	20579		manhole approximately 20 feet west of Building 728 (T-8)

source: 15501-12 and 15501-13

Physical Description

Configuration: 10-inch fiberglass[1,4,9,10] or stainless-steel pipe[Quayle]
Total Length: 395 feet[1,2,4]
Outside Length: 413 feet[9]
OPWL Connections: T-8 at Building 728[10]

Past Usage and Current Status

Date of Installation: 1969[1,4]
Date of Abandonment: May 1982[1]
Current Status: Currently used as firewater plenum for Building 771 (Quayle)
Waste Source: Building 771[9,10]

Release History

Known Releases: At intersection of P-23 with P-22[1]
T-8 identified on location map area of reported release[10]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-012-M	7/20/83	11/20/90	SITE UTILITY PLAN (B-4)
15501-013-M	7/20/83	7/20/90	SITE UTILITY PLAN (B-5)
2-4185	3/31/59		UNDERGROUND UTILITIES LAYOUT ZONES G-6, G-7, H-6 & H-7
14262-009-105	1/20/66		PLUTONIUM AREA UNDERGROUND PIPING PLAN, SECTION & DETAILS
14267-009	10/6/69		RELOCATION OF PROCESS WASTE LINES AT NEW COOLING TOWER SITE

Comments

None

OPWL PIPE DATA SUMMARY: P-24

Location

Building or Area: Building 771
General Location: North of Buildings 771 and 771C[9,10]
Location - Features:

North	East	Elev	Feature
38194	20897		manhole northeast of Building 771 (pipe reducer) P-24/P-25 intersection
38197	20897		elbow
38197	20609		elbow
38204	20609		Building 728(T-8)

source: 15501-13

Physical Description

Configuration: 6-inch cast iron pipe[1,4,9,10]
Total Length: 306 feet[1]
290 feet[2]
180 feet[4]

Outside Length: 295 feet[9]
OPWL Connections: P-25 (3-inch cast iron, stainless-steel, and steel pipe) north of Building 771C[1,4,9,10]
T-8 at Building 728[10]
P-22 (6-inch cast iron pipe)

Past Usage and Current Status

Date of Installation: 1966[1,4]
Date of Abandonment: May 1982[1]
Current Status: Abandoned[1]

Waste Source: Building 771[9,10]

Release History

Known Releases:	At intersection of P-24 with P-22 and P-25[1] Both ends of pipeline identified on location map area of reported release[10] Leak of 22 gph at 20 psig detected in 1971 pressure test[11]. Further tests disclosed extensive valve leakage accounted for 7 gph. Hand probing showed saturation along E-20893, from N-38140 to N-38197. This area is between Buildings 771 and 774, where the new 3 in. line has been joined to existing 6 in. cast iron line.

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-013-M	7/20/83	7/20/90	SITE UTILITY PLAN (B-5)
14262-009-105	1/20/66		PLUTONIUM AREA UNDERGROUND PIPING PLAN, SECTION & DETAILS
2-4185	3/31/59		UNDERGROUND UTILITIES LAYOUT ZONES G-6, G-7, H-6 & H-7
14267-009	10/6/69		RELOCATION OF PROCESS WASTE LINES AT NEW COOLING TOWER SITE

Comments

Utility drawing[9] indicates P-24 is a forced flow process waste line.
Unclear if Section 12 of 1971 pressure test[11] includes all of P-24.

OPWL PIPE DATA SUMMARY: P-25

Location

Building or Area: Building 771
General Location: North of and beneath Building 771C to valve vault north of T-29[9,10]
Location - Features:

North	East	Elev	Feature
37798	21076		valve vault north T-29
37912	21072		elbow south of 774
37912	20988		P-34/P-25 intersection
37912	20953		elbow south of 771C
37984	20893		elbow south of 771C
38194	20897		manhole northeast of Building 771 (pipe reducer, P-24/P-25 intersection)

source: 15501-13, 15507-5

Physical Description

Configuration: 3 inch stainless steel, cast iron, and steel[1,4,9,10]

Total Length: 562 feet[1]
575 feet[2]
516 feet[4]
Outside Length: 495 feet[9]
OPWL Connections: P-24 (6-inch cast iron pipe) north of Building 771C[9,10]
Valve vault north of T-29 (possible connection to P-27/P-28, P-29, P-35, and P-46)[9,10]

Past Usage and Current Status

Date of Installation: Portions in 1965 and 1972[1,4]
Date of Abandonment: May 1982[1]
Current Status: Abandoned[1]
Waste Source: Building 771[9,10]

Release History

Known Releases:	At intersection with P-24, P-27/P-28, and P-35[1] North end of pipeline, section beneath Building 771C, intersection of P-25 and P-34, and valve vault north of T-29 identified on location map as area of reported release[10] Leak of 22 gph at 20 psig detected in 1971 pressure test[11]. Further test disclosed extensive valve leakage accounted for 7 gph. Hand probing showed: - Saturation along E-20893, from N-38140 to N-38197. This area is between Building 771 and 774, where the new 3 in. line has been joined to existing 6 in. cast iron line. - Leakage north of valve pit near T-29, west of propane tanks - Leakage north of valve pit near T-29, 2 and 10 ft from pit

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-013-M	7/20/83	7/20/90	SITE UTILITY PLAN (B-5)
15507-005			PROCESS WASTE LAYOUT ZONE B-5
15507-002	11/9/73		PROCESS WASTE LAYOUT ZONE B-5
14267-009	10/6/69		RELOCATION OF PROCESS WASTE LINES AT NEW COOLING TOWER SITE
14262-009-105	1/20/66		PLUTONIUM AREA UNDERGROUND PIPING PLAN, SECTION & DETAILS

Comments

Utility drawing[9] indicates P-25 is a forced flow process waste line.

OPWL PIPE DATA SUMMARY: P-26

Location

Building or Area: Building 774
General Location: Building 774 to Pond 207-A[9,10]
Location - Features:

North	East	Elev	Feature
38072	21081		Building 774
38033	21152		elbow
38012	21732		elbow
37949	21735		Solar Pond 207-A

source: 15501-13 and 15501-14

Physical Description

Configuration: 2 pipes - 1.5-inch polyvinyl chloride[1,4,10]
2 pipes - one 1.5-inch stainless-steel and one polyvinyl chloride[9]
Total Length: 2750 feet (total)[1]
635 feet (each)[2]
1500 feet (total)[4]
Outside Length: 1445 feet[9]
OPWL Connections: None[9,10]

Past Usage and Current Status

Date of Installation: 1972[1]
Date of Abandonment: Late 1970s[1]
Current Status: Abandoned[1,2]
Waste Source: Building 774[9,10] and Pond 207-A

Release History

Known Releases: None[1]
Leak of radioactive liquid process waste occurred 7/21/80
Entire pipeline identified on location map as area of reported release[10]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-013-M	7/20/83	7/20/90	SITE UTILITY PLAN (B-5)
15501-014-M	7/20/83	7/20/90	SITE UTILITY PLAN (B-6)
14262-009-105	1/20/66		PLUTONIUM AREA UNDERGROUND PIPING PLAN, SECTION & DETAILS
14267-009	10/6/69		RELOCATION OF PROCESS WASTE LINES AT NEW COOLING TOWER SITE
38544-X10-4	6/12/89		UTILITY DEMOLITION PLAN
38544-101-6	6/12/89		SITE UTILITY PLAN

Comments

Utility drawings[9] indicate P-26 changes from 1.5 inch stainless steel to 1.5 inch polyvinyl chloride as it crosses from Area B-5 to B-6, with no clear indication of where the transition occurs.

OPWL PIPE DATA SUMMARY: P-27

Location

Building or Area: Building 774
General Location: East of Building 774[10]
Location - Features:

North	East	Elev	Feature
Original Alignment (1952)			
37932	21077		pipe designation changes to P-28 (spool)
37997	21077	5974.4	elbow
38015	21060		elbow
38015	21025		elbow
38071	21025		Building 774
P-27 Re-alignment (1968)			
37997	21077		elbow from original alignment
38052	21077		elbow northeast of T-14
38052	21025		Building 774 pipeline connection

source:dwg5703-74D and 38544-X10

Physical Description

Configuration: 3-inch stainless steel[1,4,9,10]
Total Length: 185 feet[1]
195 feet[2]
Outside Length: 125 feet[9]
OPWL Connections: P-28 (3-inch stainless-steel pipe) southeast of Building 774[10]

Past Usage and Current Status

Date of Installation: 1952[Drwaings 5703-740 and 15507-5]
Date of Re-alignment: 1968[1,4]
Date of Abandonment: 1982[Mike Welch]
Current Status: Abandoned[Mike Welch]
Waste Source: Building 774[9,10]

Release History

Known Releases:

At intersection of P-27 with P-28[1]
Entire pipeline identified on location map as area of reported release[10]
Leak of 14 gph at 20 psig detected in 1971 pressure test[11]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-013-M	7/20/83	7/20/90	SITE UTILITY PLAN (B-5)
14267-009	10/6/69		RELOCATION OF PROCESS WASTE LINES AT NEW COOLING TOWER SITE
38544-101-6	6/12/89		SITE UTILITY PLAN
1-5703-74	9/29/52	10/22/58	INDUSTRIAL WASTE-BUILDINGS 71 & 74 AREA ...
23544-207-45	7/24/72	9/1/74	PERMANENT PIPING TIE-INS PIPING PLAN
15507-005			PROCESS WASTE LAYOUT ZONE B-5
38544-X10-4	6/12/89		UTILITY DEMOLITION PLAN
15507-002	11/9/73		PROCESS WASTE LAYOUT ZONE B-5
1-3763-207	6/5/56		FACILITY 207, PIPING PLAN, WASTE DISCHARGE
14262-009-105	1/20/66		PLUTONIUM AREA UNDERGROUND PIPING PLAN, SECTION & DETAILS

Comments

Distinction between P-27 and P-28 appears only in Closure Plan[10]. Utility drawing[9] indicates one continuous pipe.

OPWL PIPE DATA SUMMARY: P-28

Location

Building or Area: Building 774
General Location: North of Tank T-29[10]
Location - Features:

North	East	Elev	Feature
37776	21077		T-29
37786	21077	5978.4	first valve vault north of T-29
37797	21077		second valve vault north of T-29
37932	21077		pipe designation changes to P-27

source:15501-13,15507-5, and 5703-74D

Physical Description

Configuration:	3-inch stainless-steel pipe[1,4,9,10] 3- and 4-inch cast iron pipe[5]
Total Length:	111 feet (each)[1,4] 115 feet (each)[2]
Outside Length:	128 feet[9]
OPWL Connections:	P-27 (3-inch stainless-steel pipe) southeast of Building 774[9,10] Valve vault north of T-29 (possible connection to P-25, P-35, P-43, and P-46)[9,10]

Past Usage and Current Status

Date of Installation:	1952(original)[Drawings 5703-74D and 15507-5]
Date of Abandonment:	1982[Mike Welch]
Current Status:	Abandoned[Mike Welch]
Waste Source:	Building 774[9,10]

Release History

Known Releases:

At intersection of P-28 with P-25 and P-27[1]

Old cast iron lines between Building 774 and valve pit north of T-29; 3 in. line leaked 14 gph, replaced in April 1972[5]

Entire pipeline identified on location map as area of reported release[10]

Leak of 14 gph at 20 psig detected in 1971 pressure test[11]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-013-M	7/20/83	7/20/90	SITE UTILITY PLAN (B-5)
14267-009	10/6/69		RELOCATION OF PROCESS WASTE LINES AT NEW COOLING TOWER SITE
1-3763-207	6/5/56		FACILITY 207, PIPING PLAN, WASTE DISCHARGE
14262-009-105	1/20/66		PLUTONIUM AREA UNDERGROUND PIPING PLAN, SECTION & DETAILS

Comments

Distinction between P-27 and P-28 appears only in Closure Plan[10]. Utility drawing[9] indicates one continuous pipe.

OPWL PIPE DATA SUMMARY: P-29

Location

Building or Area: Building 774
General Location: East of and beneath Building 774[10] to valve vault north of T-29[9,10]
Location - Features:

North	East	Elev	Feature
Original Alignment			
37786	21078	5978.4	first valve vault north of T-29
37797	21078		second valve vault north of T-29
37932	21078		pipeline spool
37997	21078	5974.4	elbow to the northwest
38016	21061		elbow to the west
38016	21026		elbow to the north
38071	21026		Building 774
P-29 Re-alignment			
37997	21078		elbow from original alignment
38053	21078		elbow northeast of T-14
38053	21025		Building 774 pipeline connection

source:dwg5703-74D

Physical Description

Configuration: Original 4-inch cast iron[Drawing 5703-74D]
Realignment 4-inch stainless-steel pipe[1,9,10]
Total Length: 197 feet[1]
Outside Length: 130 feet[9]
OPWL Connections: T-13, T-14, and T-16 at Building 774[10]
Valve vault north of T-29 (possible connection to P-58, P-63, and P-64)[9,10]

Past Usage and Current Status

Date of Installation (original): 1952[1]
Date of Re-alignment: 1968
Date of Abandonment: 1982[Mike Welch]
Current Status: Abandoned[Mike Welch]
Waste Source: Building 774[9,10]

Release History

Known Releases:

None[1]
Entire pipeline, T-14, and T-16 identified on location map as area of reported release[10]
Leak of 45 gph at 20 psig detected in 1971 pressure test[11]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-013-M	7/20/83	7/20/90	SITE UTILITY PLAN (B-5)
38544-X10-4	6/12/89		UTILITY DEMOLITION PLAN
1-5703-74	9/29/52	10/22/58	INDUSTRIAL WASTE-BUILDINGS 71 & 74 AREA ...
23544-207-45	7/24/72	9/1/74	PERMANENT PIPING TIE-INS PIPING PLAN
38544-101-6	6/12/89		SITE UTILITY PLAN

Comments

Closure Plan[10] indicates P-29 continues north to beneath Building 774.

OPWL PIPE DATA SUMMARY: P-30

Location

Building or Area: Building 777
General Location: North of Building 777 and beneath Buildings 776 and 777[10]
Location - Features:

North	East	Elev	Feature
37637	20770		Building 777
37669	20770		intersection with P-30 spur
37710	20770		Building 730 (T-9 and T-10)
P-30.1 Spur (identified in OU-9 Work Plan)			
37669	20770		intersection with P-30
37669	20798		Building 777
P-30.2 Spur (new)			
37678	20770		intersection with P-30
37678	20807		elbow
37675	20807		Building 777

source: 15501-13 and 15501-21

Physical Description

Configuration: 4-inch steel pipe[1]
2-, 3-, 4-, and 6-inch pipe[3]
4- and 6-inch steel pipe[9,10]
Total Length: 667 feet[1]
1377 feet[3]
Outside Length: 70 feet[2]
100 feet[9]
OPWL Connections: T-9 and T-10 at Building 730[10]

Past Usage and Current Status

Date of Installation: 1957[1]
Date of Abandonment: October 1982[1]
Current Status: Decontaminated, removed, and replaced with inspectable pipe[1]
Abandoned[2]
Waste Source: Building 776 and 777[9,10]

Release History

Known Releases: None(1)

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-013-M	7/20/83	7/20/90	SITE UTILITY PLAN (B-5)
25845-X06-S-6	77?		REPLACE UNINSPECTABLE PROCESS WASTE SYSTEM PIPING ABANDONMENT PLAN, DETAILS BUILDING 776?
25845-X16-S-4	5/11/78		REPLACE UNINSPECTABLE PROCESS WASTE SYSTEM PIPING ABANDONMENT PLAN DETAILS BUILDING 778
25845-X05-S	12/15/77		REPLACE UNINSPECTABLE PROCESS WASTE SYSTEM PIPING ABANDONMENT PLAN DETAILS BUILDING 778
13726-001-2	2/19/63	3/16/64	PLOT AND GRADING PLAN
24615-003	1/25/72		RADIOGRAPHY DRAIN PROCESS WASTE DRAIN PLAN
25847-003-39	12/15/77	11/15/79	REPLACE UNINSPECTABLE WASTE SYSTEM TRANSFR PUMPS-FIR WATER STORAGE, ELECT INSTR
25845-008-13	5/11/78		REPLACE PROCESS WASTE SYSTEM REMOVABLE TOP SLAB SECTIONS & DETAILS
25846-001-S	12/15/77	5/22/79	REPLACE UNINSPECTABLE WASTE SYSTEM NEW PIPING BUILDING 776 & 778
2-4185	3/31/59		UNDERGROUND UTILITIES LAYOUT ZONES G-6, G-7, H-6 & H-7

Comments

Reference 3 refers to drawing numbers 25845-X06S and 25845-X07S.

OPWL PIPE DATA SUMMARY: P-30.1

Location

Building or Area: Building 777
General Location: Northwest corner of Building 777
Location - Features:

North	East	Elev	Feature
Spur (identified in OU-9 Work Plan)			
37669	20770		intersection with P-30
37669	20798		Building 777

source: 15501-13 and 15501-21

Physical Description

Configuration: 3-inch stainless-steel pipe[1]
Total Length: 25 feet
Outside Length: 25 feet

OPWL Connections: P-30 (6-inch stainless-steel pipe)[10]

Past Usage and Current Status

Date of Installation: 1952[1]
Date of Abandonment: 1981[dwg 24615-3]
Current Status: Abandoned[2]
Waste Source: Building 777[9,10]

Release History

Known Releases: Unknown

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
24615-003	1/25/72		RADIOGRAPHY DRAIN PROCESS WASTE DRAIN PLAN

Comments

None

OPWL PIPE DATA SUMMARY: P-30.2

Location

Building or Area: Building 777
General Location: Northwest corner of Building 777
Location - Features:

North	East	Elev	Feature
Spur (new)			
37678	20769		intersection with P-30
37675	20807		elbow
37678	20807		Building 777

source: 15501-13 and 15501-21

Physical Description

Configuration: 3-inch stainless-steel pipe
Total Length: 50 feet[dwg 24615-3]
Outside Length: 45 feet[dwg 24615-3]

OPWL Connections: P-30 (6-inch stainless-steel pipe)[dwg 24615-3]

Past Usage and Current Status

Date of Installation: 1972[dwg 24615-3]
Date of Abandonment: October 1982[1]
Current Status: Abandoned[2]
Waste Source: Building 777[9,10]

Release History

Known Releases: Unknown

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
24615-003	1/25/72		RADIOGRAPHY DRAIN PROCESS WASTE DRAIN PLAN

Comments

None

OPWL PIPE DATA SUMMARY: P-31

Location

Building or Area: Buildings 771 and 774
General Location: Tunnel between Buildings 771 and 774[10]
Location - Features:

North	East	Elev	Feature
Building 771-774 tunnel			
38026	20816.5		Building 771
38026	20934		elbow
38062	20970		elbow
38064	20970		elbow
38064	20973		Building 774

source: 15501-13

Physical Description

Configuration: 1952-1961: 3 pipes
1/5-, 1-, and 2-inch stainless steel[Drawing 1-8256-71]
1961-1983
2-inch and 3-inch PVC pipes[Drawing 26629-1, 26629-2]

Total Length: 167 feet[1]
Outside Length: 170 feet[10]
OPWL Connections: P-22 (6-inch cast iron pipe) at Building 771[10]
T-15 at Building 774(?)[10]

Past Usage and Current Status

Date of Installation: 1952[1]
Date of Abandonment: 1983[Mike Welch]
Current Status: Abandoned[1]
Drawings indicate work to be done to remove the pipes in the tunnel[3]
Waste Source: Buildings 771 and 774[9,10]

Release History

Known Releases: None[1]

Pipe tunnel has been contaminated[3].

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-013-M	7/20/83	7/20/90	SITE UTILITY PLAN (B-5)
1-8255-71	3/1/61		NEW WASTE TRANSFER LINE PIPING PLAN & SECTIONS
26629-001-12	1/5/83		REPLACE PROCESS WASTE SYSTEM BUILDING 771 TUNNEL & PIPING PLAN

Comments

Reference 3 refers to drawing number 26629-1.

OPWL PIPE DATA SUMMARY: P-32

Location

Building or Area: Building 778
General Location: North of Building 778[9,10]; north of[9,10] and beneath[10] Building 777
Location - Features:

North	East	Elev	Feature
37353.7	20576		Building 778
37367	20576		elbow
37367	20768.5		elbow
37591.8	20768.5		south end of Building 776
37637	20768.5		north end of Building 776
37710	20768.5		Building 730 (T-9 & T-10)

source: 15501-13 and 15501-21

Physical Description

Configuration:	6-inch vitrified-clay and steel pipe[1]
	4-inch steel and 6-inch cast iron pipe[3]
	6-inch cast iron pipe[4]
	4-inch cast iron and 6-inch steel pipe[9,10]
Total Length:	907 feet[1]
	535 feet[3]
Outside Length:	70 feet[2]
	72 feet[4]
	115 feet[9]
OPWL Connections:	T-9 and T-10 at Building 730[10]
	T-18 at Building 778[10]

Past Usage and Current Status

Date of Installation:	1957[1]
Date of Abandonment:	December 1982[1]
Current Status:	Decontaminated, removed, and replaced with inspectable pipe[1]
	Abandoned[2]
Waste Source:	Building 778[10]

Release History

Known Releases: None[1]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-021-M	7/20/83	5/14/90	SITE UTILITY PLAN (C-5)
15501-013-M	7/20/83	7/20/90	SITE UTILITY PLAN (B-5)
13726-001-2	2/19/63	3/16/64	PLOT AND GRADING PLAN
25846-001-S	12/15/77	5/22/79	REPLACE UNINSPECTABLE WASTE SYSTEM NEW PIPING BUILDING 776 & 778
24615-003	1/25/72		RADIOGRAPHY DRAIN PROCESS WASTE DRAIN PLAN
25845-008-13	5/11/78		REPLACE PROCESS WASTE SYSTEM REMOVABLE TOP SLAB SECTIONS & DETAILS
25847-003-39	12/15/77	11/15/79	REPLACE UNINSPECTABLE WASTE SYSTEM TRNSFR PUMPS-FIR WATER STOR, ELECT INSTR

Comments

Reference 3 refers to drawing numbers 25845-X05S, 25845-X065(6S?), and 25845-X12S.
"LD" designation given to the portion of this pipe north of Building 777 on the drawings[9,10].
LD=Laundry Drain

OPWL PIPE DATA SUMMARY: P-33

Location

Building or Area: Buildings 771 and 774
General Location: Between Buildings 771 and 774[9,10]
Location - Features:

North	East	Elev	Feature
38140	20793		Building 774
38140	20912		intersection with P-34
38140	20936		Building 771
38140	20895		intersection with P-25

source:15501-13
"shown on source drawing, but not identified as an original process waste line"

Physical Description

Configuration: 3-inch steel pipe[1]
Total Length: 142 feet[1]
Outside Length: 140 feet[9]
OPWL Connections: P-22 (6-inch cast iron) at Building 771[10]
P-34 (3-inch steel) north of Building 771C[9,10]

Past Usage and Current Status

Date of Installation: 1952[7387-2]
Date of Abandonment: 1972[1]
Current Status: Abandoned[1,9,10]
Waste Source: Buildings 771[9,10]

Release History

Known Releases: None[1]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-013-M	7/20/83	7/20/90	SITE UTILITY PLAN (B-5)

Comments

Drawings[9,10] do not indicate the configuration of P-33.

OPWL PIPE DATA SUMMARY: P-34

Location

Building or Area: Building 774
General Location: South of and beneath Buildings 771C and 774[9,10]
Location - Features:

North	East	Elev	Feature
38194	20897		intersection with P-24
38140	20895		intersection with P-25/P-33 west
38140	20912		intersection with P-33 east
38135	20912		north end of 771C (building that connects 771 &774)
38087.1	20912		south end of 771C (building that connects 771 &774)
38048	20912		elbow south of 771C
38048	20972		west end of Building 774
38048	20988		elbow west of T-15 and T-17
38005	20988		south end of Building 774
37912	20988		intersection with P-25
37912	21022		elbow south of 774
37798	21072		intersection west of valve vault
37797	20988		intersection with P-35
37714	20988		intersection with P-42

source:15501-13, 3549-207E, 14267-9

Physical Description

Configuration: 3-inch stainless-steel pipe[1]
3-inch steel pipe[9,10]
Total Length: 127 feet[1]
130 feet[2]
Outside Length: 198 feet[9]
OPWL Connections: P-25 (3-inch cast iron and steel pipe) south of Building 774[9,10]
P-33 (3-inch steel pipe) north of Building 771C[9,10]

Past Usage and Current Status

Date of Installation: 1952[1]
Date of Abandonment: 1972

Current Status: Abandoned[1]
Waste Source: Buildings 771 and 774[9,10]

Release History

Known Releases: At intersection of P-34 with P-33[1]
Intersection of P-34 with P-25, T-15, and T-17 identified on location map as area of reported release[10]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-013-M	7/20/83	7/20/90	SITE UTILITY PLAN (B-5)
1-3763-207	6/5/56		FACILITY 207, PIPING PLAN, WASTE DISCHARGE
23544-207-45	7/24/72	9/1/74	PERMANENT PIPING TIE-INS PIPING PLAN
5703-002	5/17/52	5/1/53	INDUSTRIAL WASTE PLAN & PROFILE BUILDING 81 & 74
1-3549-207	5/19/52	5/22/56	INDUSTRIAL WASTE PLAN & PROFILE BUILDING 81 & 74

Comments

None

OPWL PIPE DATA SUMMARY: P-34.1

Location

Building or Area: Building 713
General Location: West and beneath Building 713
Location - Features:

North	East	Elev	Feature
37912	20988	5979	process waste line capped
37798	20988	5980	elbow
37798	21069	5978	process waste line capped

source: 15501-13, 3549-207E, 14267-9

Physical Description

Configuration: 3-inch black iron pipe
Total Length: 83 feet[dwg 14267-9]
Outside Length: 83 feet[dwg 14267-9]
OPWL Connections: P-25 (3 inch cast iron and steel pipe)[dwg 14267-9]
P-46

Past Usage and Current Status

Date of Installation: 1957[1,4]
Date of Abandonment: 1969[dwg 14267-9]
Current Status: Abandoned[dwg 14267-9]
Waste Source: Buildings 771

Release History

Known Releases: Unknown

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
1-3763-207	6/5/56		FACILITY 207, PIPING PLAN, WASTE DISCHARGE
14267-9	1965	1969 SITE	RELOCATION OF PROCESS WASTE LINES AT NEW COOLING TOWER

Comments

None

OPWL PIPE DATA SUMMARY: P-35

Location

Building or Area: Pond 207
General Location: Valve vault north of T-29 to Pond 207C[9,10]
Location - Features:

North	East	Elev	Feature
37797	21077		large valve vault north of T-29
37797	21123		valve vault northeast of T-29
37797	21225		Solar Pond 207-C
37785	21130		manhole northeast of T-29

source: 15501-13, 3763-207C, 14267-9

Physical Description

Configuration: 3-inch steel pipe[1]
2 pipes - 3-inch steel[2,9,10]
Total Length: 144 feet[1]
135 feet[2]
Outside Length: 142 feet (each)[9]
OPWL Connections: Valve vault north of T-29 (possible connection to P-25, P-27/P-28, P-43, P-46), and P-58[9,10]
To P-38 at the manhole northeast of T-29

Past Usage and Current Status

Date of Installation: 1952[1]
Date of Abandonment: 1982[1]
Current Status: Abandoned[2]

Waste Source: Building 774, 776, 777, 778, 779[JEG]

Release History

Known Releases:	At intersection of P-35 with P-25[1]
reported	Valve vault north of T-29 identified on location map as area of release[10]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-013-M	7/20/83	7/20/90	SITE UTILITY PLAN (B-5)
14267-009	10/6/69		RELOCATION OF PROCESS WASTE LINES AT NEW COOLING TOWER SITE
1-3763-207	6/5/56		FACILITY 207, PIPING PLAN, WASTE DISCHARGE
14262-009-105	1/20/66		PLUTONIUM AREA UNDERGROUND PIPING PLAN, SECTION & DETAILS

Comments

None

OPWL PIPE DATA SUMMARY: P-36

Location

Building or Area: Pond 207
General Location: Southwest of T-29 to Pond 207-A
Location - Features:

North	East	Elev	Feature
37731	20990		Valve vault southwest of Building 703
37731	21046		elbow
37716	21050		valve vault south of T-29
37716	21495		Valve vault west of Pond 207-A
37716	21538		Solar Pond 207-A

source: 15501-13, 15501-14, and 15507-5

Physical Description

Configuration: 3-inch polyvinyl chloride and stainless-steel pipe[1,9,10]
Total Length: 599 feet[1]
530 feet[2]
Outside Length: 513 feet[9]
OPWL Connections: P-20 (3-inch stainless-steel pipe)
P-21 (3-inch stainless-steel pipe)
P-48 (cast iron pipe) near valve vault west of Pond 207-A
P-14 (3-inch Saran-lined steel pipe)

Past Usage and Current Status

Date of Installation: 1965[1]
Date of Abandonment: December 1982[1]
Current Status: Abandoned in place[1]
To be abandoned when system is upgraded to an inspectable system in the future[2]
Waste Source: Building 123, 441, 444, 559, 561, 707, 729, 865, 881, 883, 865, and 889[3,9,10]

Release History

Known Releases: At intersection of P-36 with P-20[1]
Valve vault west of Pond 207-A identified on location map as area of reported release[10]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-013-M	7/20/83	7/20/90	SITE UTILITY PLAN (B-5)
15501-014-M	7/20/83	7/20/90	SITE UTILITY PLAN (B-6)
14262-009-105	1/20/66		PLUTONIUM AREA UNDERGROUND PIPING PLAN, SECTION & DETAILS
15507-005	?		PROCESS WASTE LAYOUT ZONE B-5
1-3763-207	6/5/56		FACILITY 207, PIPING PLAN, WASTE DISCHARGE
15507-002	11/9/73		PROCESS WASTE LAYOUT ZONE B-5
14267-009	10/6/69		RELOCATION OF PROCESS WASTE LINES AT NEW COOLING TOWER SITE

Comments

Drawings(9,10) indicate P-36 changes from 3 inch polyvinyl chloride to 3 inch stainless steel as it crosses from Area B-5 to B-6, with no clear indication of where the transition occurs.

OPWL PIPE DATA SUMMARY: P-37

Location

Building or Area: Building 730 and Pond 207
General Location: Building 730 to Pond 207
Location - Features:

North	East	Elev	Feature
37728.3	20768		"Building 730 (T-9, T-10)"
37728.3	20944		elbow
37715.3	20957		elbow
37715.3	21037		valve
37715.3	21043		intersection with P-59
37715.3	21048		intersection with P-44
37715.3	21051		intersection with P-42
37715.3	21055		valve
37715.3	21497		valve vault west of Solar Pond 207-A (intersection with P-37 spur)
37715.3	21538		Solar Pond 207-A

P-37 spur: (Utility drawing shows two pipelines)

North	East	Elev	Feature
37715.3	21497		valve vault west of Solar Pond 207-A (intersection with P-37 spur)
37449	21497		elbow/valve pit
37449	21860		Solar Pond 207-B

source: 15501-13, 15501-14 and 15501-22 and work plan dwgs.

Physical Description

Configuration: 3-inch steel, polyvinyl chloride, and vitrified clay pipe(1,9,10)
3-inch pipe(3)
3-inch steel(4)

Total Length: 1449 feet(1)
1500 feet(2)
1055 feet(4)

Outside Length: 1350 feet(9)

OPWL Connections: P-47 (3 inch cement-asbestos pipe) near valve vault west of Pond 207-A(9,10)
T-9 and T-10 at Building 730(10)
Valve vault west of Pond 207-A (possible connection to P-36)(9,10)
P-42 (3 inch stainless-steel pipe)(3,4,9,10)
P-44 (3 inch steel pipe)(1)
P-59 (3 inch black iron pipe)

Past Usage and Current Status

Date of Installation:	1957[1,4]
Date of Abandonment:	December 1982[1]
Current Status:	Abandoned[1]
Waste Source:	Buildings 774, 776, 777, 778, and 779[9,10]

Release History

Known Releases: At intersection of P-37 with P-20, P-36, and P-38[1]
Northern half of section west of Pond 207-A identified on location map as area of reported release[10]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-013-M	7/20/83	7/20/90	SITE UTILITY PLAN (B-5)
15501-014-M	7/20/83	7/20/90	SITE UTILITY PLAN (B-6)
15501-022-M	7/20/83	7/20/90	SITE UTILITY PLAN (C-6)
14262-009-105	1/20/66		PLUTONIUM AREA UNDERGROUND PIPING PLAN, SECTION & DETAILS
25845-X12-S-12	12/15/77		REPLACE UNINSPECTABLE WASTE SYSTEM OUTSIDE PIPING ABANDONMENT PLAN
15507-002	11/9/73		PROCESS WASTE LAYOUT ZONE B-5
25845-X12-S-12	12/15/77		REPLACE UNINSPECTABLE WASTE SYSTEM OUTSIDE PIPING ABANDON PLAN
1-3763-207	6/5/56		FACILITY 207, PIPING PLAN, WASTE DISCHARGE
25847-003-39	12/15/77	11/15/79	REPLACE UNINSPECTABLE WASTE SYSTEM TRNSFR PUMPS-FIR WATER STOR, ELECT INSTR
14267-009	10/6/69		RELOCATION OF PROCESS WASTE LINES AT NEW COOLING TOWER SITE
15507-005			PROCESS WASTE LAYOUT ZONE B-5
25845-X09-S	12/15/77		REPLACE UNINSPECTABLE PROCESS WASTE SYSTEM PIPING ABANDONMENT PLAN DETAILS BUILDING 779
2-4185	3/31/59		UNDERGROUND UTILITIES LAYOUT ZONES G-6, G-7, H-6 & H-7
14602-001			UTILITY PLAN BUILDING 79
25845-008-13	5/11/78		REPLACE PROCESS WASTE SYSTEM REMOVABLE TOP SLAB SECTIONS & DETAILS
2-4184	3/31/59		UNDERGROUND UTILITIES LAYOUT ZONES G-5 & H-5

Comments

Reference 3 refers to drawing number 25845-X12S.

Destination of P-37 as it goes south of Pond 207-A in unclear. Closure Plan[10] indicates a continuation to Pond 207-B. Utility drawings[9] suggest a connection west of Pond 207-B to a 3 in. cement-asbestos and polyvinyl chloride pipe terminating at Building 910. This pipe has not been identified as OPWL.

Closure plan[10] indicates several sections of P-37 have been removed.

OPWL PIPE DATA SUMMARY: P-38

Location

Building or Area:	Pond 207
General Location:	Valve vault northeast of T-29 to south of Pond 207-A
Location - Features:	

Two configurations supplied for P-38
First, from Drawing 5703-3, the original configuration. The second alinement is from the utility plan and work plan and identifies the realignment associated with Building 779 construction.

North	East	Elev	Feature
Original Alignment:			
37785	21130	5975.56	manhole northeast of T-29
37400	21403	5974.05	elbow beneath 779
37400	21470	5962.05	manhole east of 779
Second Alignment:			
37785	21130	5975.56	manhole northeast of T-29
37713	21204		elbow
37713	21470		manhole west of Pond 207-A
37595	21470		elbow
37573	21492		elbow
37400	21492		manhole (intersection with P-39)

Physical Description

Configuration:	6-inch vitrified-clay pipe (original) 10-inch vitrified-clay[1,4,9,10] (replacement)
Total Length:	800 feet[1] 700 feet[2] 660 feet[4]
Outside Length:	688 feet[9]
OPWL Connections:	P-39 (6-inch vitrified-clay pipe) southwest of Pond 207-A[9,10] P-45 (6-inch vitrified-clay pipe) at valve vault northeast of T-29[9,10] P-35 (3-inch steel pipe) at the manhole northeast of T-29

P-46 (3-inch steel pipe) at the manhole northeast of T-29
P-61 (4-inch vitrified-clay pipe) at the manhole northeast of tank T-29

Past Usage and Current Status

Date of Installation:	1952[1]
Date of realignment:	mid 1960's
Date of Abandonment:	December 1982[1]
Current Status:	Abandoned[1]
Waste Source:	Building 703, 774(?), 776, 777, 778, and 779[9,10]

Release History

Known Releases: Northern half of section west of Pond 207-A identified on location map as area of reported release[10]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-013-M	7/20/83	7/20/90	SITE UTILITY PLAN (B-5)
15501-014-M	7/20/83	7/20/90	SITE UTILITY PLAN (B-6)
15501-022-M	7/20/83	7/20/90	SITE UTILITY PLAN (C-6)
5703-003	2/3/53	5/20/53	INDUSTRIAL WASTE-HOLDING TANK TO OUTFALL PLAN & PROFILE
5703-003	2/3/53	?	INDUSTRIAL WASTE-HOLDING TANK TO OUTFALL PLAN & PROFILE
14602-1	1965	?	UTILITY PLAN, BUILDING 779

Comments

The Closure Plan[10] does not indicate the configuration of this pipe.

OPWL PIPE DATA SUMMARY: P-39

Location

Building or Area: Pond 207 and Building 988
General Location: South of Pond 207-A to south of Building 988[9,10]
Location - Features:

North	East	Elev	Feature
37400	21492		manhole (intersection with P-38)
37400	22205	5962	manhole southeast of Pond 207-B
37334.8	22652	5949.6	manhole (intersection with P-40)
37307	22840	5926	manhole near security zone fence
37287	23239	5903	catch basin, P-39/Building 995 outfall
Bldg 990 spur (spur not shown on utility drawing; only on work plan)			
37400	22205	5962	manhole (intersects with P-39)
37376	22236		appears to connect to storm sewer
Spur west of Bldg 988			
37300	22928		P-39 intersection
37175	22925		termination

source: 15501-22,15501-23, 15501-24, and 5703-3

Physical Description

Configuration: 6-inch vitrified clay pipe[1,4,9,10]
Total Length: 1817 feet[1]
2020 feet[2]
2190 feet[4]
Outside Length: 1787 feet[9]
OPWL Connections: P-38 (10-inch vitrified-clay pipe) south of Pond 207-A[9,10]
P-40 (6-inch fiberglass pipe) northeast of Building 990[9,10]

Past Usage and Current Status

Date of Installation: 1952[Drawing 5703-3]
Date of Abandonment: December 1982[1]
Current Status: Abandoned in place[1]
Waste Source: Building 703, 774, 776, 777, 778, 779[9,10]

Release History

Known Releases: At P-39, east end of pipe[1]
East end of pipeline identified on location map as area of reported release[10]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-022-M	7/20/83	7/20/90	SITE UTILITY PLAN (C-6)
15501-023-M	7/20/83	6/14/90	SITE UTILITY PLAN (C-7)
15501-024-M	7/20/83	6/14/90	SITE UTILITY PLAN (C-8)
5703-003	2/3/53	?	INDUSTRIAL WASTE-HOLDING TANK TO OUTFALL PLAN & PROFILE
5703-003	2/3/53	5/20/53	INDUSTRIAL WASTE-HOLDING TANK TO OUTFALL PLAN & PROFILE
5703-004	2/3/53	5/20/53	INDUSTRIAL WASTE-HOLDING TANK TO OUTFALL PLAN & PROFILE
2-4187	3/31/59		UNDERGROUND UTILITIES LAYOUT ZONES J-5 & J-6

Comments

Closure plan[10] indicates P-39 has a south-trending branch (approximately 72 feet) to Building 990 in Area C-7 and a south-trending branch (approximately 127 feet) west of Building 988 in Area C-8, which are not indicated in the utility drawings[9].

OPWL PIPE DATA SUMMARY: P-40

Location

Building or Area: Pond B-2
General Location: Northeast of Building 990 to Pond B-2[9,10]
Location - Features:

North	East	Elev	Feature
37334.8	22652		manhole northwest of Building 990 (intersection with P-39)
37376	22900		elbow west of Building 995
37430	23030		elbow northwest of 990
37474	23090		elbow north of Building 990
37480	23433		crosses road
37565	23700		elbow northwest of B-1 pond
37600	24000		elbow north of B-1 dam
37585	24110		B-2 pond termination

source: 15501-23, 15501-24, and 37348-CO41

Physical Description

Configuration: 6-inch fiberglass pipe[1,9,10]
Total Length: 1617 feet[2]

Outside Length: 1617 feet
OPWL Connections: P-39 (6-inch vitrified-clay pipe) northeast of Building 990[9,10]

Past Usage and Current Status

Date of Installation: 1972[1]
Date of Abandonment: December 1982[1]
Current Status: Abandoned[1]
Waste Source: Building 703, 774, 776, 777, 778, 779[9,10]

Release History

Known Releases: None[1]
Small leak in portion of line under perimeter road to Pond B-2 resulting from cable laying operation; line replaced[4]
Entire pipeline identified on location map as area of reported release[10]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-023-M	7/20/83	6/14/90	SITE UTILITY PLAN (C-7)
15501-024-M	7/20/83	6/14/90	SITE UTILITY PLAN (C-8)
37348-CO41			SITE UTILITY PLAN

Comments

Fiberglass pipeline outside of security fence was all above ground. Most of the line has been removed. Two sections of pipe are still present on the hillside, one 200-foot section north of Building 995, and one 50-foot section east of Building 995 fence. Only 100 feet is below ground surface.

OPWL PIPE DATA SUMMARY: P-41

Location

Building or Area: Building 779
General Location: Building 730 to west of[9,10] and beneath[10] Building 779
Location - Features:

North	East	Elev	Feature
37730.3	20765		Building 730 (T-9 & T-10)
37730.3	20946		elbow south of Building 702
37717	20958		elbow south of Building 702
37717	20982		pipeline tee south of Building 703
37714	20982		elbow southwest of Building 703
37714	21050		intersection with P-43 south of Building 703
37714	21052		elbow in valve vault southwest of T-29
37710	21054		valve in valve vault southwest of T-29
37665	21101		elbow
37554	21101		elbow west of Building 779
37554	21105.7		Building 779

P-41.1 Spur

37717	20982		pipeline tee
37797	20982		elbow north of Building 703
37797	21069		large valve vault north of T-29

source: 15501-13, 15501-21, and 25845-X09S

Physical Description

Configuration:
3-inch vitrified-clay pipe[1]
2- and 3-inch vitrified-clay, black iron, and stainless-steel pipe[3]
3-inch stainless-steel pipe[4]
3-inch vitrified-clay and cast iron pipe[9,10]

Total Length:
1537 feet[1]
2120 feet[3]
164 feet[4]

Outside Length:
495 feet[2]
485 feet[9]

OPWL Connections:
T-9 and T-10 at Building 730[10]
T-19, T-20, and T-38 at Building 779[10]
P-43 (3-inch steel pipe)

Past Usage and Current Status

Date of Installation:	1957[1,4]
Date of Abandonment:	December 1982[1]
Current Status:	Abandoned[1]
Waste Source:	Buildings 776, 777, 778, and 779[9,10]

Release History

Known Releases:	Pipeline west of Building 779 identified on location map as area of reported release[10]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-013-M	7/20/83	7/20/90	SITE UTILITY PLAN (B-5)
15501-021-M	7/20/83	5/14/90	SITE UTILITY PLAN (C-5)
25845-008-13	5/11/78		REPLACE PROCESS WASTE SYSTEM REMOVABLE TOP SLAB SECTIONS & DETAILS
25845-X03-S-3	12/15/77		REPLACE UNINSPECTABLE WASTE SYSTEM REMOVAL PLAN
14602-001			UTILITY PLAN BUILDING 79
23471-301-9	11/2/72	3/1/75	BUILDING & PLENUM DRAINS PIPING & INSTRUMENTATION DIAGRAMS
15507-005	?		PROCESS WASTE LAYOUT ZONE B-5
14267-009	10/6/69		RELOCATION OF PROCESS WASTE LINES AT NEW COOLING TOWER SITE
25847-010-44	12/15/77	2/12/78	REPLACE UNINSPECTABLE WASTE SYSTEM TRANSFER PUMPS-BASEMENT
2-4185	3/31/59		UNDERGROUND UTILITIES LAYOUT ZONES G-6, G-7, H-6 & H-7
25847-003-39	12/15/77	11/15/79	REPLACE UNINSPECTABLE WASTE SYSTEM TRANSFER PUMPS-FIR WATER STORAGE, ELECTRICAL INSTR
25845-X10-S	12/15/77		REPLACE UNINSPECTABLE PROCESS WASTE SYSTEM PIPING, ABANDONMENT PLAN DETAILS BUILDING 779
14618-009	?		PROCESS WASTE FLOW DIAGRAMS & EQUIPMENT INSTALLATION - BUILDING 79
25845-X11-S-11	12/15/77		REPLACE UNINSPECTABLE WASTE SYSTEM PIPING REMOVAL PLAN BUILDING 779 BSMT
15507-002	11/9/73		PROCESS WASTE LAYOUT ZONE B-5
25845-X12-S-12	12/15/77		REPLACE UNINSPECTABLE WASTE SYSTEM OUTSIDE PIPING ABANDON PLAN
25845-X12-S-12	12/15/77		REPLACE UNINSPECTABLE WASTE SYSTEM OUTSIDE PIPING ABANDONMENT PLAN
14262-009-105	1/20/66		PLUTONIUM AREA UNDERGROUND PIPING PLAN, SECTION & DETAILS

Comments

Reference 3 refers to drawing numbers 25845-X-09S, 25845-X10S, and 25845-X12S.

OPWL PIPE DATA SUMMARY: P-41.1

Location

Building or Area:		Building 703	
General Location:		West and north of Building 703	
Location - Features:			
North	East	Elev	Feature

P-41A spur

North	East	Elev	Feature
37717	20982		pipeline tee
37797	20982		elbow north of Building 703
37797	21069		large valve vault north of T-29

source:15501-13,15501-21, and 25845-X09S

Physical Description

Configuration:	3-inch black iron
Total Length:	100 feet(dwg 14267-9)
Outside Length:	100 feet(dwg 14267-9)
OPWL Connections:	P-41 (3-inch stainless-steel pipe)(dwg 14267-9)
	P-43 (3-inch steel pipe)(dwg 14267-9)
	P-46 (3-inch steel)(dwg 14267-9)

Past Usage and Current Status

Date of Installation:	1957[1,4]
Date of Abandonment:	1969(dwg 14267-9)
Current Status:	Abandoned
Waste Source:	Buildings 776, 777, and 778

Release History

Known Releases:

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
14267-009	1965	1969	Relocation of process waste lines at new cooling tower site
1-3763-207	1956		Facility 207 piping plan waste discharge

Comments

None

OPWL PIPE DATA SUMMARY: P-42

Location

Building or Area: Building 779
General Location: West of[9,10] and beneath[10] Building 779
Location - Features:

North	East	Elev	Feature
37715	21015		intersection with P-34
37714	21051	5978.43	elbow
37710	21053		valve
37653	21100		elbow
37553	21100		elbow
37553	21105.7		Building 779

source: 15501-21,15501-21,14267-9 and 3763-207

Physical Description

Configuration:	3-inch cast iron pipe[1]
	3-inch stainless-steel pipe[3,4,9,10]
Total Length:	213 feet[1]
	280 feet[3]
	164 feet[4]
Outside Length:	204 feet[2]
	188 feet[9]
OPWL Connections:	P-37 (3-inch pipe) southwest of T-29[9,10]
	T-19, T-20, and T-38 at Building 779[10]

Past Usage and Current Status

Date of Installation (original):	1957[1,4]
Date of New Pipe Installation:	1965
Date of Abandonment:	December 1982[1]
Current Status:	Decontaminated, removed, and replaced with inspectable pipe[1]
	Abandoned[2]
Waste Source:	Building 779[9,10]

Release History

Known Releases: At intersection of P-42 with P-37[1]
Pipeline outside of Building 779 identified on location map as area of reported release[10]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-013-M	7/20/83	7/20/90	SITE UTILITY PLAN (B-5)
15501-021-M	7/20/83	5/14/90	SITE UTILITY PLAN (C-5)
25845-X03-S-3	12/15/77		REPLACE UNINSPECTABLE WASTE SYSTEM REMOVAL PLAN
15507-002	11/9/73		PROCESS WASTE LAYOUT ZONE B-5
25845-X11-S-11	12/15/77		REPLACE UNINSPECTABLE WASTE SYSTEM PIPING REMOVAL PLAN BUILDING 779 BASEMENT
14267-009	10/6/69		RELOCATION OF PROCESS WASTE LINES AT NEW COOLING TOWER SITE
25845-X12-S-12	12/15/77		REPLACE UNINSPECTABLE WASTE SYSTEM OUTSIDE PIPING ABANDON PLAN
25847-010-44	12/15/77	2/12/78	REPLACE UNINSPECTABLE WASTE SYSTEM TRANSFER PUMPS-BASEMENT
25845-X12-S-12	12/15/77		REPLACE UNINSPECTABLE WASTE SYSTEM OUTSIDE PIPING ABANDONMENT PLAN
14262-009-105	1/20/66		PLUTONIUM AREA UNDERGROUND PIPING PLAN, SECTION & DETAILS
15507-005	?		PROCESS WASTE LAYOUT ZONE B-5
14602-001	?		UTILITY PLAN BUILDING 79
25845-X09-S	12/15/77		REPLACE UNINSPECTABLE PROCESS WASTE SYSTEM PIPING ABANDONMENT PLAN DETAILS, BUILDING 779
14618-009	?		PROCESS WASTE FLOW DIAGRAMS & EQUIPMENT INSTALLATION - BUILDING 79

Comments

Reference 3 refers to drawing numbers 25845-X-09S, 25845-X10S, and 25845-X12S.

Terminal end beneath Building 779 plugged per detail "X01", drawing 25845-X05[3].

OPWL PIPE DATA SUMMARY: P-43

Location

Building or Area: Building 703
General Location: Southwest of T-29 to valve vault north of T-29[9,10]
Location - Features:

North	East	Elev	Feature
37714	21049		intersection with P-41
37768	21050	5979.25	elbow northwest of T-29
37789	21069	5979.21	elbow northwest of T-29
37797	21069		elbow northwest of T-29
37797	21076		second valve vault north of T-29

source: 15501-13, 15507-5, 14267--9

Physical Description

Configuration: 3-inch steel pipe[1,3,9,10]
Total Length: 103 feet[1]
90 feet[2]
105 feet[3]
Outside Length: 100 feet[9]
OPWL Connections: P-41 (3-inch vitrified-clay pipe) southwest of T-29[9,10]
Valve vault north of T-29 (possible connection to P-25, P-27/P-28, P-29, P-35, and P-46)[9,10]

Past Usage and Current Status

Date of Installation: 1969[Drawing 14267-9]
Date of Abandonment: December 1982[1,2,3]
Current Status: Abandoned[1]
Waste Source: Buildings 776, 777, 778, and 779[9,10]
Waste Characterization:

Release History

Known Releases:

Large valve vault north of T-29[1]
Entire pipeline identified on location map as area of reported release[10]
Valve vault located southwest of T-29

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-013-M	7/20/83	7/20/90	SITE UTILITY PLAN (B-5)
25845-X12-S-12	12/15/77		REPLACE UNINSPECTABLE WASTE SYSTEM OUTSIDE PIPING ABANDONMENT PLAN
14267-009	10/6/69		RELOCATION OF PROCESS WASTE LINES AT NEW COOLING TOWER SITE
15507-005			PROCESS WASTE LAYOUT ZONE B-5
15507-002	11/9/73		PROCESS WASTE LAYOUT ZONE B-5
14262-009-105	1/20/66		PLUTONIUM AREA UNDERGROUND PIPING PLAN, SECTION & DETAILS

Comments

Reference 3 refers to drawing number 25845-X12S.
"LD" designation given this pipe on the drawings[9,10]. LD=Laundry Drain

OPWL PIPE DATA SUMMARY: P-44

Location

Building or Area: Building 703
General Location: Valve vault southwest of Building 703 to valve vault north of T-29[9,10]
Location - Features:

North	East	Elev	Feature
37795	21076		second valve vault north of T-29
37795	21074		elbow west of valve vault
37789	21074	5979.71	elbow south of valve vault
37767	21048	5979.29	elbow northwest of T-29
37715	21048	5978.83	elbow intersection with P-37

source: 15501-13, 15507-5, 14267-9

Physical Description

Configuration: 3-inch steel pipe[1]
Total Length: 92 feet[1]
70 feet[2]
75 feet[3]
135 feet[9]
OPWL Connections: Valve vault north of T-29 (possible connection to Lines P-25, and P-29[9,10]
P-37 (3-inch steel pipe) at valve vault southwest of T-29
P-59 (3-inch black iron pipe) west of valve vault north of T-29

Past Usage and Current Status

Date of Installation: 1969[1]
Date of Abandonment: December 1982[1]
Current Status: Abandoned[1]
Waste Source: Buildings 123, 441, 444, 559, (561?), 707, 865, 881, 883, and 889[9,10]

Release History

Known Releases: At intersection of P-44 with P-25[1]
Pipeline east of Building 703 identified on location map as an area of reported release[10]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-013-M	7/20/83	7/20/90	SITE UTILITY PLAN (B-5)
25845-X12-S-12	12/15/77		REPLACE UNINSPECTABLE WASTE SYSTEM OUTSIDE PIPING ABANDONMENT PLAN
14267-009	10/6/69		RELOCATION OF PROCESS WASTE LINES AT NEW COOLING TOWER SITE
15507-002	11/9/73		PROCESS WASTE LAYOUT ZONE B-5
14262-009-105	1/20/66		PLUTONIUM AREA UNDERGROUND PIPING PLAN, SECTION & DETAILS
15507-005			PROCESS WASTE LAYOUT ZONE B-5

Comments

Reference 3 refers to drawing number 25845-X12S.

OPWL PIPE DATA SUMMARY: P-45

Location

Building or Area: Building 703
General Location: Building 703 to manhole northeast of T-29[9,10]
Location - Features:

North	East	Elev	Feature
37746	21043		Building 703
37746	21049		elbow
37728	21067		elbow
37728	21091		elbow
37763	21126		elbow
37780	21126		elbow
37783	21130		manhole northeast of T-29

source: 15501-13

Physical Description

Configuration: 6-inch vitrified-clay pipe[9,10]
Total Length: 125 feet[2]
130 feet[9]
OPWL Connections: P-38 (10-inch vitrified-clay pipe) at valve vault northeast of T-29[9,10]

Past Usage and Current Status

Date of Installation: 1966[Drawing 15507-5]
Date of Abandonment: Unknown
Current Status: Temporarily in use; to be abandoned[2]
Waste Source: Building 703[9,10]

Release History

Known Releases: None[2]
West end of pipeline identified on location map as area of reported release[10]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-013-M	7/20/83	7/20/90	SITE UTILITY PLAN (B-5)
14262-009-105	1/20/66		PLUTONIUM AREA UNDERGROUND PIPING PLAN, SECTION & DETAILS
14267-009	10/6/69		RELOCATION OF PROCESS WASTE LINES AT NEW COOLING TOWER SITE

Comments

See comments for P-38 regarding the 4 inch vitrified clay pipe at the valve vault northeast of T-29.

OPWL PIPE DATA SUMMARY: P-46

Location

Building or Area:		Pond 207	
General Location:		Valve vault north of Tank T-29 to Pond 207-C[9,10]	
Location - Features:			
North	East	Elev	Feature
37798	21077		second valve vault north of T-29
37798	21123		valve vault northeast of T-29
37798	21225		Solar Pond 207-C
37785	21130		manhole northeast of T-29

source: 15501-13, 14267-9, 3763-207

Physical Description

Configuration: 3-inch steel[3,9,10]

Total Length: 135 feet[1]
140 feet[3]
142 feet[9]

OPWL Connections: Vault north of T-29 (possible connection to P-25, P-27/P-28, and P-38)[9,10]

Past Usage and Current Status

Date of Installation: Unknown (possibly 1952)

Date of Abandonment: Unknown (possibly 1982)

Current Status: Abandoned[2]

Waste Source: Building 771, 774(?)[9,10]

Release History

Known Releases: None[2]
Valve vault north of T-29 identified on location map as area of reported release[10]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-013-M	7/20/83	7/20/90	SITE UTILITY PLAN (B-5)
14267-009	10/6/69		RELOCATION OF PROCESS WASTE LINES AT NEW COOLING TOWER SITE
14262-009-105	1/20/66		PLUTONIUM AREA UNDERGROUND PIPING PLAN, SECTION & DETAILS
1-3763-207	6/5/56		FACILITY 207, PIPING PLAN, WASTE DISCHARGE

Comments

"LD" designation given this pipe on the drawings[9,10]. LD=Laundry Drain

OPWL PIPE DATA SUMMARY: P-47

Location

Building or Area: Pond 207-C
General Location: Pond 207-C to near valve vault west of Pond 207-A
Location - Features:

North	East	Elev	Feature
37813	21460		Solar Pond 207-C
37813	21483		elbow
37805	21483		valve
37774	21483		elbow
37765	21500		elbow
37712	21500		elbow
37712	21497		intersection with P-37

source: 15501-14

Physical Description

Configuration: 3-inch cement-asbestos[9,10]
Total Length: 125 feet[2]
135 feet[9]
OPWL Connections: P-37 (3-inch steel/stainless-steel pipe) near valve vault west of Pond 207-A[9,10]

Past Usage and Current Status

Date of Installation: Unknown
Date of Abandonment: Unknown
Current Status: Temporarily in use; to be abandoned[2]
Waste Source: Building 774(?)[9,10]

Release History

Known Releases: None[2]
Valve vault west of Pond 207-A identified on location map as area of reported release[10]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-014-M	7/20/83	7/20/90	SITE UTILITY PLAN (B-6)

Comments

Drawings[9,10] indicate P-47 is a secondary reverse osmosis brine pipe, not a process waste pipe.

OPWL PIPE DATA SUMMARY: P-48

Location

Building or Area:	Pond 207
General Location:	South of[9,10] and beneath[10] Building 788
Location - Features:	

North	East	Elev	Feature
37716.3	21494	intersection with P-36	
37930	21495	intersection with P-49(?)	

"the existence of this line has not been verified; it is shown on work plan as "?" and is not on utility drawing.

source:work plan drawings

Physical Description

Configuration:	Cast Iron[WWE]
Total Length:	193 feet[1]
Outside Length:	65 feet[9]
OPWL Connections:	P-36 (3-inch stainless-steel pipe) near valve vault west of Pond 207-A[9,10]

Past Usage and Current Status

Date of Installation:	Unknown
Date of Abandonment:	Unknown
Current Status:	To be abandoned when the system is upgraded to an inspectable system in the future[2]
Waste Source:	Building 774

Release History

Known Releases:	None[2] Valve vault west of Pond 207-A identified on location map as area of reported release[10]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-014-M	7/20/83	7/20/90	SITE UTILITY PLAN (B-6)

Comments

Drawings[9,10] do not indicate the configuration of P-48. Destination of P-48 unclear.

OPWL PIPE DATA SUMMARY: P-49

Location

Building or Area:		Pond 207	
General Location:		Between Ponds 207C and 207-A[9,10]	
Location - Features:			
North	East	Elev	Feature
37927	21536		Solar Pond 207-A
37934	21453		Solar Pond 207-C

source:15501-14 and 19379-4

Physical Description

Configuration:	8-inch cast iron pipe[9,10]
Total Length:	85 feet[2]
Outside Length:	60 feet[9] 85 feet[10]
OPWL Connections:	None[9,10]

Past Usage and Current Status

Date of Installation:	Unknown
Date of Abandonment:	Unknown
Current Status: the	To be abandoned when system is upgraded to an inspectable system in future[2]
Waste Source:	Building 774(?)[9,10]

Release History

Known Releases:	Unknown

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-014-M	7/20/83	7/20/90	SITE UTILITY PLAN (B-6)
19379-003-3	1/4/71	7/9/70	EVAP POND 207C PIPING SYSTEM PLAN & DETAILS
19379-004-4	7/9/70	1/4/71	EVAP POND 207C PIPING SYSTEM DETAILS

Comments

Unclear if a portion of P-49 was removed for construction of Building 788A[9].

OPWL PIPE DATA SUMMARY: P-50

Location

Building or Area: Pond 207
General Location: Between Ponds 207-A and 207-B[9,10]
Location - Features:

North	East	Elev	Feature
37970	21859		Solar Pond 207-B
37970	21818		elbow
37967	21818		elbow
37967	21809		elbow
37964	21809		elbow
37964	21793		valve
37964	21757		Solar Pond 207-A

note: configuration given for P-50 is slightly different than work plan and utility plan source provided below seems to give more detail than work plan and/or utility plan

source:6393-207B

Physical Description

Configuration: 8-inch cast iron pipe[3,9,10]
Total Length: 105 feet[2]
85 feet[3]
Outside Length: 55 feet[9]
OPWL Connections: None[9,10]

Past Usage and Current Status

Date of Installation: Unknown
Date of Abandonment: Unknown
Current Status: To be abandoned when system is upgraded to an inspectable system in the future[2]
Waste Source: Building 774(?)[9,10]

Release History

Known Releases: None[2]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-014-M	7/20/83	7/20/90	SITE UTILITY PLAN (B-6)
1-6393-207B	2/21/60	3/21/60	INDUSTRIAL WASTE-FACILITY 207-TRANSFR PUMP PIPING & PAD EVAPORATION POND

Comments

None

OPWL PIPE DATA SUMMARY: P-51

Location

Building or Area:	Building 778
General Location:	Beneath Building 778
Location - Features:	

source:25845-X05S
and 25845-X16
and work plan dwgs.

Physical Description

Configuration:	4- and 6-inch black iron pipe[3]
Total Length:	170 feet[3]
Outside Length:	0[10]
OPWL Connections:	T-18 at Building 778[10]

Past Usage and Current Status

Date of Installation:	1957[3]
Date of Abandonment:	1978[3]
Current Status:	Abandoned after 5/11/78 (portion above floor slab was removed)[3]
Waste Source:	Building 778[10]

Release History

Known Releases:	None[3]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-021-M	7/20/83	5/14/90	SITE UTILITY PLAN (C-5)
25845-X05-S-5	12/15/77		REPLACE UNINSPECTABLE WASTE SYSTEM PIPING ABANDONMENT PLAN-BUILDING 778

Comments

Reference 3 refers to drawing numbers 25845-X16 and 25845-X05S.
Drains and wall penetrations plugged with expansive cement[3].

OPWL PIPE DATA SUMMARY: P-52

Location

Building or Area:	Building 443
General Location:	South of and beneath Building 443[10]
Location - Features:	

source:25838-DO4
and work plan dwgs.

Physical Description

Configuration:	4-inch pipe[3b]
Total Length:	280 feet[3a]
Outside Length:	15 feet[3b]
	42 feet[10]
OPWL Connections:	None[10]

Past Usage and Current Status

Date of Installation:	Unknown
Date of Abandonment:	Unknown
Current Status:	Decontaminated and abandoned in place or removed after 8/10/78[3b]
	Floor drains plugged and abandoned in place[3b]
Waste Source:	Building 443[10]

Release History

Known Releases:	None[3a]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-009	1/30/67	10/2/68	UTILITY LAYOUT (E-3)

Comments

Reference 3a refers to drawing numbers 25838-DX1 and 25838-D01 through 25838-D05. Reference 3b refers to drawing number 25838-X04.

OPWL PIPE DATA SUMMARY: P-53

Location

Building or Area: Buildings 881 and 887
General Location: Between Buildings 881 and 887
Location - Features:

North	East	Elev	Feature
35208.67	20746.75	5978.83	Building 881
35156	20746.75		elbow
35156	20723.5		elbow
35153.67	20723.5	5962.58	Building 887

source: 25609-13-02C & 25609-X08

Physical Description

Configuration: 2-inch stainless-steel pipe[4,9,10]
Total Length: 78 feet[4]
Outside Length: 65 feet[9]
OPWL Connections: T-24 and T-32 at Building 887[10]

Past Usage and Current Status

Date of Installation: 1952[4]
Date of Abandonment: 1976[4]
Current Status: Abandoned under authorization #365556[4]
Waste Source: Building 881[9,10]

Release History

Known Releases: Entire pipeline identified on location map as area of reported release[10]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-054-M	7/20/83	7/20/90	SITE UTILITY PLAN (F-5)
25609-X06-19	6/17/76		REPLACE PROCESS WASTE SYSTEM PIPING REMOVAL
25609-X08-21	6/17/76		REPLACE PROCESS WASTE SYSTEM PIPING REMOVAL
2-4180	3/31/59		UNDERGROUND UTILITIES LAYOUT ZONES G-1 & H-1
25609-013-M-35	6/17/76	4/28/92	REPLACE PROCESS WASTE SYSTEM SITE PIPING
25609-013-02C-21	5/13/92		REPLACE PROCESS WASTE SYSTEM PIPING REMOVAL
25609-013-01C	5/13/92		REPLACE PROCESS WASTE SYSTEM PIPING

Comments

Drawing 15507-4 Detail 1[4]
Drawings [9,10] indicates this pipe is a nitrogen line; not a process waste line.

OPWL PIPE DATA SUMMARY: P-54

Location

Building or Area:	Buildings 881 and 887
General Location:	South of [9,10] and beneath[10] Building 881 to Building 887
Location - Features:	

North	East	Elev	Feature
35208.67	20682.5	5966.08	Building 881
35152.59	20682.5		elbow north of manhole
35138.09	20697.58		elbow west of Building 887
35138.09	20705.75	5959.5	elbow at northwest corner of vault
35090	20705.75		elbow at southwest corner of vault
35090	20707		Building 887

source: dwg 25609-X08 and 25609-13-02C

Physical Description

Configuration:	2.5-inch flex PVC tubing inside 3-inch stainless-steel pipe[4,9,10]
Total Length:	140 feet[4]
Outside Length:	138 feet[9]
OPWL Connections:	P-6 (3-inch steel pipe) at Building 881[10]
	T-24 and T-32 at Building 887[10]

Past Usage and Current Status

Date of Installation:	1952[4]
Date of Abandonment:	N/A (is part of the current transfer system)
Current Status:	Double contained, authorization #365556[4]
Waste Source:	Building 881[9]

Release History

Known Releases:	Entire pipeline identified on location map area of reported release[10]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-054-M	7/20/83	7/20/90	SITE UTILITY PLAN (F-5)
25609-014-M-36	6/17/76	4/28/92	REPLACE PROCESS WASTE SYSTEM PIPING
25609-013-02C-21	5/13/92		REPLACE PROCESS WASTE SYSTEM PIPING REMOVAL
25609-X08-21	6/17/76		REPLACE PROCESS WASTE SYSTEM PIPING REMOVAL
25609-013-M-35	6/17/76	4/28/92	REPLACE PROCESS WASTE SYSTEM SITE PIPING
25609-X09-22	6/17/76		REPLACE PROCESS WASTE SYSTEM PIPING REMOVAL
25609-014-01C	5/13/92		REPLACE PROCESS WASTE SYSTEM PIPING
81-619	3/20/52	8/17/53	PROCESS PIPING BELOW 1ST FLOOR-SECTIONS & DETAILS-SOUTH END BUILDING 81
1-1693-81	5/16/52	2/15/65	PLAN PROCESS WASTE COLLECTION & SEWAGE LIFT STATION
81-INDEX E	11/6/52	8/17/53	DRAWING INDEX - BUILDING 81 - PROCESS PIPING
2-4180	3/31/59		UNDERGROUND UTILITIES LAYOUT ZONES G-1 & H-1
25609-006-M-28	6/17/76	4/28/92	REPLACE PROCESS WASTE SYSTEM SITE PIPING
25609-013-01C	5/13/92		REPLACE PROCESS WASTE SYSTEM PIPING
2-4180	3/31/59		UNDERGROUND UTILITIES LAYOUT ZONES G-1 & H-1

Comments

Drawing 15507-1 Detail 1[4]

OPWL PIPE DATA SUMMARY: P-55

Location

Building or Area: Buildings 881 and 887
General Location: Between Buildings 881 and 887[9,10]
Location - Features:

North	East	Elev	Feature
35208.67	20735.7	5978.54	Building 881
35138.67	20735.67		elbow
35138.67	20732	5960.8	Building 887

source: 25609-X08, and 25609-13-02C

Physical Description

Configuration: 4-inch stainless-steel pipe[4,10]

Total Length: 158 feet[4]
Outside Length: 75 feet[9]
OPWL Connections: T-24 and T-32 at Building 887[9,10]

Past Usage and Current Status

Date of Installation: 1952[4]
Date of Abandonment: 1976[Drawing 75609-X08]
Current Status: Abandoned
Waste Source: Building 881[9,10]

Release History

Known Releases: Unknown

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-054-M	7/20/83	7/20/90	SITE UTILITY PLAN (F-5)
25609-013-M-35	6/17/76	4/28/92	REPLACE PROCESS WASTE SYSTEM SITE PIPING
25609-013-01C	5/13/92		REPLACE PROCESS WASTE SYSTEM PIPING

Reference Drawings (continued)

25609-013-02C-21	5/13/92	REPLACE PROCESS WASTE SYSTEM PIPING REMOVAL
2-4180	3/31/59	UNDERGROUND UTILITIES LAYOUT ZONES G-1 & H-1
2-4180	3/31/59	UNDERGROUND UTILITIES LAYOUT ZONES G-1 & H-1
25609-X08-21	6/17/76	REPLACE PROCESS WASTE SYSTEM PIPING REMOVAL

Comments

Drawing 15507-1 Detail 1[(4)]

"LD" designation given this pipe in drawings[(9)]. LD=Laundry Drain

OPWL PIPE DATA SUMMARY: P-56

Location

Building or Area: Buildings 771 and 774
General Location: Tunnel between Buildings 771 and 774
Location - Features:

North	East	Elev	Feature
Buildings 771-774 tunnel			
38026	20816.5		Building 771
38026	20934		elbow
38062	20970		elbow
38064	20970		elbow
38064	20973		Building 774

source:15501-13

Physical Description

Configuration:	Three 2-inch and one 1-inch PVC pipes[Drawing 26629-1, 26629-2]
	Three 1-inch plastic and two 2-inch plastic hose pipes[4]
Total Length:	167 feet (each)[4]
Outside Length:	170 feet[10]
OPWL Connections:	P-22 (6-inch cast iron pipe) at Building 771[10]

Past Usage and Current Status

Date of Installation:	1983[Drawing 1-8255-71]
Date of Abandonment:	1990[Mike Welch]
Current Status:	Unknown
Waste Source:	Buildings 771 and 774[10]

Release History

Known Releases:	None; lines were in a tunnel, double contained and inspectable[4]

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
15501-013-M	7/20/83	7/20/90	SITE UTILITY PLAN (B-5)
26629-001-12	1/5/83		REPLACE PROCESS WASTE SYSTEM BUILDING 771 TUNNEL & PIPING PLAN
1-8255-71	3/1/61		NEW WASTE TRANSFER LINE PIPING PLAN & SECTIONS

Comments

None

OPWL PIPE DATA SUMMARY: P-57

Location

Building or Area:	Building 122
General Location:	South of Building 122
Location - Features:	N/A

Physical Description

N/A

Past Usage and Current Status

N/A

Release History

N/A

Reference Drawings

N/A

Comments

N/A = Not Applicable
P-57 appears to be an invalid Pipeline Designation

OPWL PIPE DATA SUMMARY: P-58

Location

Building or Area: Building 703[1]
General Location: South and east of Building 703[1]
Location - Features:

North	East	Elev	Feature
37728	20990	5980	valve vault southwest of Building 703[1]
37728	21043		elbow southeast of Building 703[1]
37796	21043		elbow northeast of Building 703[1]
37796	21074	5978	valve vault north of T-29[1]

Physical Description

Configuration: 3-inch black iron pipe[1]
Total Length: 90 feet[1]
OPWL Connections: P-20 (3-inch stainless-steel pipe) at valve vault southwest of 703
P-21 (3-inch stainless-steel pipe) at valve vault southwest of 703
P-35 (3-inch steel pipe) at valve vault north of T-29
P-29 (4-inch cast iron pipe) at valve vault north of T-29

Past Usage and Current Status

Date of Installation: 1952
Date of Abandonment: 1969[1]
Current Status: Abandoned (removal-unknown)
Waste Source: Buildings in 100, 800, 500, 400 areas (process waste)

Release History

Known Releases: Unknown

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
D-14267-9	1965	1969	RELOCATION OF PROCESS WASTE LINES AT NEW COOLING TOWER SITE
1-3763-207	1956		FACILITY 207 PIPING PLAN WASTE DISCHARGE

Comments

Ref (1) refers to Drawing 14267-9

OPWL PIPE DATA SUMMARY: P-59

Location

Building or Area: Building 703[1]
General Location: East of Building 703[1]
Location - Features:

North	East	Elev	Feature
37795	21073	5978	valve vault north of T-29[1]
37795	21043	5978	elbow west to south[1]
37718	21043	5978	process waste line capped at P-37[1]

Physical Description

Configuration: 3-inch black iron pipe[1]
Total Length: 70 feet[1]
OPWL Connections: P-37 (3-inch stainless-steel/PVC/vitrified-clay pipe) at location near valve vault southwest of T-29
P-46 (3-inch steel pipe) at valve vault north of T-29
P-25 (3-inch black iron pipe) at valve vault north of T-29
P-29 (4-inch cast iron pipe) at valve vault north of T-29

Past Usage and Current Status

Date of Installation: 1952[1]
Date of Abandonment: 1969[1]
Current Status: Abandoned (removal-unknown)[1]
Waste Source: Building 774

Release History

Known Releases: Unknown

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
D-14267-9	1965	1969	RELOCATION OF PROCESS WASTE LINES AT NEW COOLING TOWER SITE
1-3763-207	1956		FACILITY 207 PIPING PLAN WASTE DISCHARGE

Comments

Ref (1) refers to Drawing 14267-1

OPWL PIPE DATA SUMMARY: P-60

Location

Building or Area:	Tank T-29[1,2]
General Location:	Northwest of T-29[1,2]
Location - Features:	

North	East	Elev	Feature
37783	21080		valve vault north of T-29[2]
37783	21087		elbow from east to southeast[2]
37776	21097		elbow from southeast to east[1]
37776	21224		outfall into Pond 207-C[2]

Physical Description

Configuration:	4-inch black iron or vitrified-clay pipe[3]
Total Length:	180 feet[2]
OPWL Connections:	P-29 (4-inch cast iron pipe) at valve vault north of T-29

Past Usage and Current Status

Date of Installation:	1952
Date of Abandonment:	1970
Current Status:	Abandoned and removed
Waste Source:	Building 774

Release History

Known Releases:	Unknown

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
D-14267-9	1965	1969	RELOCATION OF PROCESS WASTE LINES AT NEW COOLING TOWER SITE
1-3763-207	1956		FACILITY 207 PIPING PLAN WASTE DISCHARGE

Comments

Ref (1) refers to Drawing 14267-1, (2) refers to Drawing 1-3763-207, (3) refers to the manhole investigation conducted by JEG

OPWL PIPE DATA SUMMARY: P-61

Location

Building or Area: Tank T-29[1,2]
General Location: Northwest of T-29[1,2]
Location - Features:

North	East	Elev	Feature
37785	21080		valve vault north of T-29[1]
37785	21130		manhole northeast of T-29[1]

Physical Description

Configuration: 4-inch vitrified-clay pipe[1]
Total Length: 70 feet[1]
OPWL Connections: P-29 (4-inch cast iron pipe) at valve vault north of T-29
P-38 (10-inch PVC and vitrified-clay pipe) at manhole located northeast of T-29

Past Usage and Current Status

Date of Installation: 1952
Date of Abandonment: 1982
Current Status: Abandoned
Waste Source: Building 774

Release History

Known Releases: Unknown

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
D-14267-9	1965	1969	RELOCATION OF PROCESS WASTE LINES AT NEW COOLING TOWER SITE
1-3763-207	1956		FACILITY 207 PIPING PLAN WASTE DISCHARGE

Comments

Ref (1) refers to Drawing 14267-1, (2) refers to Drawing 1-3763-207

OPWL PIPE DATA SUMMARY: P-62

Location

Building or Area:	Building 559
General Location:	Between Buildings 559, 561, and 528
Location - Features:	

North	East	Elev	Feature

Physical Description

Configuration:	2.5-inch PVC 2.5-inch stainless steel 1.5-inch stainless steel
Total Length:	60 feet 120 feet
Outside Length:	0 feet 80 feet
OPWL Connections:	T-7 in Building 528

Past Usage and Current Status

Date of Installation:	1976
Date of Abandonment:	N/A
Current Status:	90 day accumulation
Waste Source:	Buildings 559 and 561

Release History

Known Releases:	Unknown

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
25607-1	1975	1976	REPLACE PROCESS WASTE SYSTEM, SITE PIPING

Comments

Pipeline is currently undergoing closure. Line may be brought back into use for the new transfer system. Stainless-steel pipes are inside a 6 inch casing.

OPWL PIPE DATA SUMMARY: P-63

Location

Building or Area:	Building 886
General Location:	Between Buildings 886 and 828
Location - Features:	

North	East	Elev	Feature

Physical Description

Configuration:	2-inch steel pipe - 40 feet 3-inch steel pipe - 60 feet
Total Length:	100 feet
Outside Length:	100 feet
OPWL Connections:	OPWL T-22 inside Building 828 RFP T-11

Past Usage and Current Status

Date of Installation:	1963
Date of Abandonment:	Unknown
Current Status:	Unknown
Waste Source:	Building 886, Building 886 Waste

Release History

Known Releases:	Unknown

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
25925-X04			
25926-1			
25925-1			
14830-4	9/63		Process holding and waste pit piping
23482-301	8/72		

Comments

None

OPWL PIPE DATA SUMMARY: P-64

Location

Building or Area: Building 886
General Location: Between Buildings 886 and 828
Location - Features:

North	East	Elev	Feature

Physical Description

Configuration: Four 1-inch stainless-steel pipes inside 8-inch Schedule 40 steel pipe, 25 feet; and two 1-inch stainless-steel pipes inside 6-inch Schedule 40 steel pipe, 40 feet

Total Length: 65 feet
Outside Length: 65 feet
OPWL Connections: OPWL T-22 inside Building 828
RFP T-9 Pu Holding Tank
RFP T-10 U Holding Tank

Past Usage and Current Status

Date of Installation: 1963
Date of Abandonment: Unknown
Current Status: Unknown
Waste Source: Building 886, two 1-inch pipelines carried Pu, two 1-inch pipelines carried U

Release History

Known Releases: Unknown

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
25925-X04	7/77	NA	Subsurface drainage control piping removal plan
25926-1			
25925-1			
25926-2			
14830-4	1963		Process holding and waste pit piping
14685-1	1965		Flow diagram uranium test facility

Comments

None

OPWL PIPE DATA SUMMARY: P-65

Location

Building or Area:	Building 886
General Location:	Northwest of Building 828
Location - Features:	From Building 828 to sanitary sewer lift station

Physical Description

Configuration:	2-inch ductile iron
Total Length:	80 feet
Outside Length:	80 feet
OPWL Connections:	OPWL T-22 inside Building 828 RFP T-11

Past Usage and Current Status

Date of Installation:	1963
Date of Abandonment:	Unknown
Current Status:	Unknown
Waste Source:	Building 886 Waste, from RFP Tank T-11 in Pit 828

Release History

Known Releases:	Unknown

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
Utility Drawings			
20829-19			
25925-1			
14685-1	1964		Flow diagram uranium test facility
23482-301	1972		Site and utility plan

Comments

None

OPWL PIPE DATA SUMMARY: P-66

Location

Building or Area:	Building 886
General Location:	Between Buildings 886 and 828
Location - Features:	

Physical Description

Configuration:	2-inch stainless-steel 4-inch secondary containment
Total Length:	50 feet
Outside Length:	50 feet
OPWL Connections:	OPWL T-22 inside Building 828 RFP T-11

Past Usage and Current Status

Date of Installation:	1977
Date of Abandonment:	Unknown
Current Status:	Unknown
Waste Source:	Building 886

Release History

Known Releases:	Unknown

Reference Drawings

Drawing No.	Orig. Date	Rev. Date	Drawing Title
25926-1	7/77		Subsurface drainage control new piping plan
25926-2	7/77		Subsurface drainage control new piping plan
23402-301	10/72		Site utility plan
14830-4	9/63		Process holding and waste pit piping

Comments

None

APPENDIX D
OPWL PIPE DATA SUMMARY REFERENCES

References used to compile the OPWL Pipe Data Summary Sheets are cited as numerical superscripts on the sheets. The majority of the data are taken from references cited in the pipe data summary sheets contained in Appendix B of the *Original Process Waste Lines Closure Plan* (DOE 1988). No attempt has been made to verify the accuracy of these citations. Following are the references cited in the Closure Plan pipe data summaries:

(1) U.S. Department of Energy. 1986 (November 28). *Resource Conservation and Recovery Act, Post-Closure Care Permit Application, for U.S.D.O.E. - Rocky Flats Plant, Hazardous and Radioactive Mixed Wastes*. Prepared by Rockwell International, CO7890010526, Appendix A-5, Original Process Waste Lines Closure Plan, Revision 0.

(2) U.S. Department of Energy. 1985 (December). *Conceptual Design Report, Environmental Improvement Projects, Underground Piping and Tank Removal.* Prepared by Rockwell International Facilities Engineering Department, Rocky Flats Plant, Golden, Colorado, Authorization 389801.

(3) Rockwell International Drawings. The specific drawing number is cited in the comments section of the data summary sheet.

(4) Rockwell International. 1976 (September 1). *Survey of the Status of Existing Process Waste Lines.* Prepared by Ginger Sunday, Atomics International Division, Rocky Flats Plant, Golden, Colorado. Unnumbered report.

(5) Dow Chemical Company. 1971 (March). Process Waste Layout, Drawing Number SK-410204-2.

(6) Rockwell International. 1980 (October). *Report of an Investigation on a Recent Process Waste Pipeline Leak.* ES-376-80-217, 24.

(7) Rockwell International. 1983 (May 5). *Unusual Occurrence Report - Valve Vault #7 Overflow, April 4, 1983.* UOR Number RFP 83-2-SAGE 83-1.

(8) Dow Chemical Company. 1973. *A Historical Summation of Environmental Incidents Affecting Soils at or near the U.S. AEC Rocky Flats Plant.* Prepared by J.B. Owen and L.M. Steward. Draft.

In addition, the following references were used to supplement the Closure Plan references:

(9) EG&G Rocky Flats, Inc. 1983, rev. 1990. Rocky Flats Plant Site Utility Plans, Facilities Engineering Department, Drawings 15501-1-M through 15501-59-M.

(10) U.S. Department of Energy. 1988 (October). *Resource Conservation and Recovery Act, Post-Closure Care Permit Application for U.S.D.O.E. - Rocky Flats Plant, Hazardous and Radioactive Mixed Wastes*. Prepared by Rockwell International, CO7890010526, Appendix I-5, Volumes XIV-XVI, Original Process Waste Lines Closure Plan, Revision 1.

(11) International Leak Detection Services. 1971 (August). *Pressure Testing and Leak Location Survey of Process Waste Lines at the Rocky Flats Plant*. Prepared for the Dow Chemical Company, Rocky Flats Division, Golden, Colorado. Purchase Order No. PRE-73627-E, Phase I.

APPENDIX E

Utility and Engineering Drawing Reference List

Draft

JACOBS ENGINEERING GROUP INC

ROCKY FLATS PLANT
DATA COMPILATION FOR OU 9 - OPWL,

REFERENCE DRAWINGS

DRAWING NO.			SHT NO.	ISSUE	ORIG DATE	REV DATE	OPWL REF	BLDG REF	AREA	DRAWING TITLE	COM
STICK 1											
1	1693	81		A	5/16/52	2/15/65	54,57	887	800	PLAN PROCESS WASTE COLLECTION & SEWAGE LIFT STA	
1	3549	207		E	5/19/52	5/22/56	1,13,14,20,2	774, 881	700, 800	INDUSTRIAL WASTE PLAN & PROFILE BLDG 81 & 74	
1	3763	207			6/5/56		21,27,28,34-37,	774	700	FACILITY 207, PIPING PLAN, WASTE DISCHARGE	
1	5703	74		D	9/29/52	10/22/58	27, 29	774	700	IND WASTE-BLDGS 71 & 74 AREA ...	
1	6393	2078		B	2/21/60	3/21/60	50		700	IND WASTE-FAC 207-TRNSFR PUMP PIPING & PAD EVAP POND	
1	8255	71			3/1/61		31, 56	771, 774	700	NEW WASTE TRANSFER LINE PIPING PLAN & SECTS	
1	11590	23		D	2/7/52	6/8/65	1,2,3	123	100	PLUMBING & SERV PIPING RF DR, SAN DR & PROC DR	
2	4180				3/31/59		6-8,53-55	881	800	UNDERGROUND UTIL LAYOUT ZONES G-1 & H-1	
2	4181				3/31/59		4,6,9	881, 883	800	UNDERGROUND UTIL LAYOUT ZONES G-2 & H-2	
2	4182				3/31/59		4,6,9,12,13	883	800	UNDERGROUND UTIL LAYOUT ZONES G-3 & H-3	
2	4183				3/31/59		6,12,13,14	707	700, 800	UNDERGROUND UTIL LAYOUT ZONES G-4 & H-4	
2	4184				3/31/59		14, 37	776, 777	700	UNDRGRD UTIL LAYOUT ZONES G-5 & H-5	
2	4185				3/31/59		22-24,30,37,41	771,774, 776	700	UNDERGROUND UTIL LAYOUT ZONES G-6, G-7, H-6 & H-7	
2	4187				3/31/59		39		700	UNDERGROUND UTIL LAYOUT ZONES J-5 & J-6	
2	4188				3/31/59		NONE	91	900	UNDERGROUND UTIL LAYOUT ZONES K-4, K-5, L-4 & L-5	
76	1420			5	3/9/56	4/8/57	30, 32	776, 777	700	PROCESS & SANITARY DRAINAGE SYS BLDG 76 & 77	
76	13216			2	2/9/56	1/13/57	30,37,41	776, 777	700	PROCESS WASTE STORAGE TANKS BLDGS 76 & 77	
81	INDEX E			E	11/6/52	8/17/53	54	881	800	DWG INDX - BLDG 81 - PROCESS PIPING	
81	601			B	8/12/52	8/17/53		881	800	PROC PIPING AT 1ST FLR CEILING-CENT & S-SECTS & DETS-BLDG 81	
81	608			B	8/6/52	8/17/53		881	800	PROC PIPING AT 2ND FLR-S END- BLDG 81	
81	619			G	3/20/52	8/17/53	54	881	800	PROC PIPING BELOW 1ST FLR-SECTS & DETS-S END BLDG 81	
81	620			F	3/20/52	8/17/53		881	800	PROC PIPING BELOW 1ST FLR-SECTS & DETS-S END BLDG 81	
81	621			G	3/21/52	8/17/53		881	800	PROC PIPING BELOW 1ST FLR-S END-SECTS & DETS- BLDG 81	
5703	002			D	5/17/52	5/1/53	1,13,14,20,2	774, 881	700, 800	INDUSTRIAL WASTE PLAN & PROFILE BLDG 81 & 74	
5703	003			C	2/3/53	5/20/53	38, 39		700	INDUST WASTE-HOLD TK TO OUTFALL PLAN & PROFILE	
5703	004			C	2/3/53	5/20/53	39	T207	700	INDUST WASTE-HOLD TK TO OUTFALL PLAN & PROFILE	
8836	003			2	12/20/59	3/21/60	14,20,21	777	700	GENERAL SITE PLAN & UTILITY PLAN	
13726	001		2		2/19/63	3/16/64	30, 32	776, 777	700	PLOT AND GRADING PLAN	
14264	009		105		1/20/66		20-28,35-37,41-46	TK 207	700	PLUTONIUM AREA UNDERGROUND PIPING PLAN, SECT & DETS	
14267	009			A	10/6/69		20-28,35-37,41-46	TK 207	700	RELOCATION OF PW LINES AT NEW COOLING TOWER SITE	
14602	001						14,20,37,41,4	776 - 779	700	UTILITY PLAN BLDG 79	
14618	009						41, 42	779	700	PW FLOW DIAGRAMS & EQUIP INSTALLATION - BLDG 79	
14929	001			A	1/14/52	2/2/54		771	700	BLDG 71 DETAILS PLUMBING	
15507	002			B	11/9/73		20,25,27,36,37,4	771 - 779	700	PROCESS WASTE LAYOUT ZONE B-5	

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Draft

JACOBS ENGINEERING GROUP INC

ROCKY FLATS PLANT
DATA COMPILATION FOR OU 9 - OPWL,

REFERENCE DRAWINGS

DRAWING NO.			SHT NO.	ISSUE	ORIG DATE	REV DATE	OPWL REF	BLDG REF	AREA	DRAWING TITLE	COM
15507	005			A			20,25,27,36,37,4	771 - 779	700	PROCESS WASTE LAYOUT ZONE B-5	
19379	003		3	C	1/4/71	7/9/70	49	POND 207	700	EVAP POND 207C PIPING SYS PLAN & DETS	
19379	004		4	B	7/9/70	1/4/71	49		700	EVAP POND 207C PIPING SYS DETS	
19527	001		6	B	9/25/70	11/1/71	17	559	500	SITE PLAN - UTILITIES	
STICK 2											
20829	018			NONE	8/6/68		6,9,10	865,883,889	800	UTILITY LAYOUT	VOID
23471	301		9	A	11/2/72	3/1/75	41	779, 782	700	BLDG & PLENUM DRAINS PIPING & INSTRUMENTAION DIAGRAMS	
23544	207		45	2	7/24/72	9/1/74	27,29,34	774	700	PERMANENT PIPING TIE-INS PIPING PLAN	
23723				F	7/22/52	?	1,2,3,4,5,6	123, 441	100, 400	IND WASTE FOR BLDG NOS. 23 & 41, GEN PLAN & PROF	
24386	001		1	B	10/15/73	1/23/79	17	559	500	PROCESS LINE REPLACEMENT LAYOUT	
24386	002		2	B	10/15/73	1/23/74	17	559	500	PROCESS LINE REPLACEMENT LAYOUT (CONT'D)	
24615	003			A	1/25/72		30, 32	777	700	RADIOGRAPHY DRAIN PROCESS WASTE DRAIN PLAN	
25540	004		4	A	5/15/75		17	559	500	REPLACE UNINSPECT PW SYS BLDG 559 SECT 1 ABAND PIPING	
25540	005		5	A	5/15/75		17	559	500	REPLACE UNINSPECT PW SYS BLDG 559 SECTOR 2 ABAN PIPING	
25540	006		6	A	5/15/79		17	559	500	REPLACE UNINSPECT PW SYS BLDG 559 SECTOR 3 ABAN PIPING	
25540	007		7	A	5/15/75		17	559	500	REPLACE UNINSPECTABLE PW SYS BLDG 559...	
25540	012		12	B	5/15/75	5/22/75	17	559, 561	500	REPLACE UNINSPECT PW SYS BLDG 559/561 ABAND & NEW PIPING	
25608	001		4	B	6/17/76	9/16/77	16, 17	559, 562	500	REPLACE PROCESS WASTE SYS BLDG 559 TO VV10	
25608	002	M	5	D	6/17/76	4/28/92	6	881	800	REPLACE PROCESS WASTE SYS BLDG 881 TO VV-1	
25608	003	M	6	D	6/17/76	4/28/92	9	883	800	REPLACE PROCESS WASTE SYS BLDG 883 TO VV-2	
25608	007		10	B	6/13/76	9/16/77		559	500	REPLACE PROCESS WASTE SYS SHOWER STALLS	
25608	008	M	11	D	6/17/76	4/28/92				REPLACE PROCESS WASTE SYS INSPECTABLE SUMP	
25608	009		12	B	6/17/76	9/16/77				REPLACE PROCESS WASTE SYS SUMPS & DETS	
25608	010	M	13	D	6/17/76	4/29/92		559, 887	500, 800	REPLACE PROCESS WASTE SYS SUMPS & DETS	
25608	X01		1	A	6/17/76			559,883,887	800, 500	REPLACE PROCESS WASTE SYS-TITLE & COVER SHEET	
25608	X02		2	A	6/17/76			ALL	ALL	REPLACE PROCESS WASTE SYS-AREA PLOT PLAN	
25608	X03		3	A	6/17/76			887	800	REPLACE PROCESS WASTE SYS REMOVALS	
25609	001		23	B	6/17/76	9/16/77	16, 17	559, 561	500	REPLACE PROCESS WASTE SYS SITE PIPING	
25609	002		24	B	6/17/76	9/16/77	17	559	500	REPLACE PROCESS WASTE SYS PIPING-WEST HALF	
25609	003		25	B	6/17/76	9/16/77	17	559	500	REPLACE PROCESS WASTE SYS PIPING-EAST HALF	
25609	004		26	C	6/17/76	12/20/89	17	559	500	REPLACE PROCESS WASTE SYS PIPING DETAILS	
25609	005		27	B	6/17/76	9/16/77	17	559	500	REPLACE PROCESS WASTE SYS PIPING DETAILS	
25609	007	M	28	D	6/17/76	4/28/92	6,9,54	881,883	800	REPLACE PROCESS WASTE SYS SITE PIPING	

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JACOBS ENGINEERING GROUP INC

ROCKY FLATS PLANT
DATA COMPILATION FOR OU 9 - OPWL,

REFERENCE DRAWINGS

DRAWING NO.			SHT NO.	ISSUE	ORIG DATE	REV DATE	OPWL REF	BLDG REF	AREA	DRAWING TITLE	COM
25609	008	M	30	C	6/17/76	1/17/87		881	800	REPLACE PROCESS WASTE SYS - PIPING	
25609	008	01C		A	5/13/92			881	800	REPLACE PROCESS WASTE SYS - PIPING	
25609	009	M	31	C	6/17/76	1/17/87		883	800	REPLACE PROCESS WASTE SYS - PIPING	
25609	010	M	32	D	6/17/76	4/28/92		883	800	REPLACE PROCESS WASTE SYS - PIPING	
25609	013	M	35	D	6/17/76	4/28/92	7,8,53,54,55	881,887	800	REPLACE PROCESS WASTE SYS SITE PIPING	
25609	013	01C		A	5/13/92		7,8,53,54,55	881,887	800	REPLACE PROCESS WASTE SYS PIPING	
25609	013	02C	21	A	5/13/92		7,8,53,54,55	881,887	800	REPLACE PROCESS WASTE SYS PIPING REMOVAL	
25609	014	M	36	D	6/17/76	4/28/92	7,54	887	800	REPLACE PROCESS WASTE SYS PIPING	
25609	014	01C		A	5/13/92		7,54	887	800	REPLACE PROCESS WASTE SYS PIPING	
25609	X01		14	A	6/17/76		17	559, 561	500	REPLACE PROCESS WASTE SYS PIPING REMOVAL	
25609	X02		15	A	6/17/76		17	559	500	REPLACE PROCESS WASTE SYS-PIPING REMOVAL	
25609	X03		16	A	6/17/76		17	559	500	REPLACE PROCESS WASTE SYS-PIPING REMOVAL	
25609	X05		18	A	6/17/76			881	800	REPLACE PROCESS WASTE SYS PIPING REMOVAL	
25609	X06		19	A	6/17/76		8,53	881	800	REPLACE PROCESS WASTE SYS PIPING REMOVAL	
25609	X07	M	29	D	6/17/76	4/28/92		881	800	REPLACE PROCESS WASTE SYS - PIPING	
25609	X07		20	A	6/17/76			883	800	REPLACE PROCESS WASTE SYS PIPING REMOVAL	
25609	X08		21	A	6/17/76		7,8,53,54,55	881,887	800	REPLACE PROCESS WASTE SYS PIPING REMOVAL	
25609	X09		22	A	6/17/76		7,54	887	800	REPLACE PROCESS WASTE SYS PIPING REMOVAL	
25788	X05		5	A	12/7/77		19	707	700	REPL WASTE COLLECT SYS BLDG 707 REMOVAL PLAN PART B, 1ST FLR	
25788	X06		6	A	12/7/77		19	707	700	REPL WASTE COLLECT SYS BLDG 707 REMOVAL PLAN PART C, 1ST FLR	
25788	X07		7	A	12/7/77		19	707	700	REPL WASTE COLLECT SYS BLDG 707 REMOVAL PLAN PART D, 1ST FLR	
25838	020		12	B	8/14/80	10/6/81	52	443	400	REPL UNINSPECT PW SYS PIPING INSTALL PLAN	
25838	X04		4	A	8/14/80			443	400	REPLACE UNINSPECT PW SYS-PIPING REMOVAL PLAN	
25838	X06		2	A	9/26/80			444, 447	400	REPLACE UNINSPECT PW SYS-PIPING REMOVAL PLAN	
25838	X07		3	A	9/26/80			444	400	REPLACE UNINSPECT PW SYS-BSMNT PIPING REMOVAL PLAN	
25838	X08		4	A	9/26/80			444	400	REPLACE UNINSPECT PW SYS-PIPING REMOVAL PLAN-RM 125	
25838	X09		5	A	9/26/80			447	400	REPLACE UNINSPECT PW SYS-PIPING REMOVAL PLAN	
25838	X10		6	A	9/26/80			444	400	REPLACE UNINSPECT PW SYS-PIPING REMOVAL DETAILS	
25845	001		6	B	5/11/78	8/8/79					
25845	008		13	A	5/11/78		30,32,37,41	730	700	REPLACE PROC WASTE SYS REMOVABLE TOP SLAB SECTS & DETS	
25845	X03	S	3	B	12/15/77		41, 42	730, 779	700	REPLACE UNINSPECT WASTE SYS REMOVAL PLAN	
25845	X05	S	5	A	12/15/77		30,51	778	700	REPLACE UNINSPECT WASTE SYS PIPING ABAND PLAN-BLDG 778	
25845	X06	S	6	A	77?		30	776	700	REPL UNINSPECT PW SYS PIPING ABAND PLAN DETS BLDG 776?	
25845	X07	S		A	12/15/77		20	777	700	REPL UNINSPECT PW SYS PIPING ABAND PLAN DETS BLDG 777	
25845	X08	S	8	B	12/15/77			729, 776	700	REPL UNINSPECT WASTE SYS PIPING ABANDON BLDG 729 & 776	

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JACOBS ENGINEERING GROUP INC

ROCKY FLATS PLANT
DATA COMPILATION FOR OU 9 - OPWL,

REFERENCE DRAWINGS

DRAWING NO.			SHT NO.	ISSUE	ORIG DATE	REV DATE	OPWL REF	BLDG REF	AREA	DRAWING TITLE	COM
25845	X09	S		A	12/15/77		37, 42	779	700	REPL UNINSPECT PW SYS PIPING ABAND PLAN DETS BLDG 779	
25845	X10	S		A	12/15/77		41	779	700	REPL UNINSPECT PW SYS PIPING ABAND PLAN DETS BLDG 779	
25845	X11	S	11	A	12/15/77		41, 42	779	700	REPLACE UNINSPECT W SYS PIPING REMOVAL PLAN BLDG 779 BSMT	
25845	X12	S	12	A	12/15/77		37,41-44	776-779	700	REPLACE UNINSPECT WASTE SYS OUTSIDE PIPING ABAND PLAN	
25845	X16	S	4	A	5/11/78		30	778	700	REPL UNINSPECT PW SYS PIPING ABAND PLAN DETS BLDG 778	
25846	001	S		C	12/15/77	5/22/79	30, 32	776-778	700	REPL UNINSPECT WASTE SYS NEW PIPING BLDG 776 & 778	
25847	003		39	B	12/15/77	11/15/79	30,32,37,41	730	700	REPLACE UNINSPECT WAS SYS TRNSFR PUMPS-FIR WATER STOR, ELECT IN	
25847	010		44	B	12/15/77	2/12/78	41, 42	779	700	REPLACE UNINSPECT WASTE SYS TRANSFER PUMPS-BASEMENT	
26085	002			A	12/3/81			731	700	ISOMETRIC OF CROSS-CONNECTION TO OSBL SYS	
26085	003			A	12/3/81			528	500	ISOMETRIC OF CROSS-CONNECTION TO OSBL SYS	
26085	005			A	12/3/81		1	123	100	PLAN VIEW OF CROSS-CONNECTION TO OSBL SYS	
26378	001		25	C	8/21/81	1/20/87	10	865, 889	800	REPLACE PW SYS PLAN & PROFILE	
26378	005		29	D	8/21/81	1/20/87	10	866	800	REPLACE PW SYS EQUIP & PIPING BLDG 866	
26378	X02		21	A	8/21/81		10	865	800	REPLACE PROCESS WASTE SYS REMOVAL PLAN	
26378	X03		22	A	8/21/81		10	865	800	REPLACE PROCESS WASTE SYS REMOVAL PLAN	
26378	X04		23	A	8/21/81		10	865	800	REPLACE PROCESS WASTE SYS ABAND & REMOVAL PLAN	
26378	X05		24	A	8/21/81		10	865	800	REPLACE PROCESS WASTE SYS ABAND & REMOVAL PLAN	
26379	X01		20	A	8/21/81		10	865	800	REPLACE PROCESS WASTE SYS REMOVAL PLANS & SECTS	
26629	001		12	A	1/5/83		31, 56	771, 774	700	REPLACE PW SYSTEM BLDG 771 TUNNEL & PIPING PLAN	
27216	001		2	C	5/17/74	1/19/87	2	123	100	REPLACE PROCESS WASTE LINE PIPING PLAN - AREA #1	
27216	002		3	C	5/17/74	1/19/87	1	123	100	REPLACE PROCESS WASTE LINE PIPING PLAN - AREA #2	
27216	003		4	C	5/17/74	2/3/87	1,2	123	100	REPLACE PROCESS WASTE LINE PIPING DETAILS	
27216	004		5	C	5/17/74	2/3/87	1,2	123	100	REPLACE PROCESS WASTE LINE PIPING DETAILS	
27216	006			B	5/17/74	2/5/75		123	100	REPLACEMENT OF PW LINES ELECTRICAL	
STICK 3											
37810	057			A	1/20/87					PROC LIQ WASTE COLLECT & TRNSFR SYS RCRA PERMIT UNIT	
38170	422		3	A	10/20/89			460	400	BLDG 460 PW UNDERGROUND DRAIN PIPING EXC SECTS	
38544	101		6	A	6/12/89		26,27,29	774	700	SITE UTILITY PLAN	
38544	X10		4	A	6/12/89		26,27,29	774	700	UTILITY DEMOLITION PLAN	
38551	206		9	A	7/22/88		17	559	500	SECONDARY CONTAINMENT UPGRADES	
38849	400			B	5/11/89	7/25/89	1	123	100	UNDERGROUND DRAIN PIPING PLAN, SECTS & DETS	
39894	215			A	6/25/92		17	528	500	REPAIR SUMP FIBERGLASS LINER CYL DETS & GEN NOTES	
RF-BZ	21622	11	19	B	8/18/69	10/28/71		122,123	100	ADDITION & RENOVATION SANITARY SEWER SITE PLAN	

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JACOBS ENGINEERING GROUP INC

ROCKY FLATS PLANT
DATA COMPILATION FOR OU 9 - OPWL,

REFERENCE DRAWINGS

DRAWING NO.			SHT NO.	ISSUE	ORIG DATE	REV DATE	OPWL REF	BLDG REF	AREA	DRAWING TITLE	COM
RF-BZ	21622	31	26	C	8/18/69	10/28/71	3,4	441	400	ADDITION & RENOVATION SITE PLAN - UTILITIES	
RF-BZ	21622	32	27	B	8/18/69	10/28/71	3,4	441	400	ADDITION & RENOVATION SITE PLAN - UTILITIES	
RF-BZ	21641	11	15	B	8/18/69	10/28/71		122	100	ADDITION & RENOVATION FOUNDATION PLAN	
RF-BZ	21651	11	21	B	8/18/69	10/28/71		122	100	ADDITION & RENOVATION PLUMBING PLAN & DETS	
RF-BZ	21651	12	22	C	8/18/69	10/28/71		122	100	ADDITION & RENOVATION SERVICE PIPING - PLAN & ISO	
RF-BZ	21651	31	28	C	8/18/69	10/28/71		441	400	ADDITION & RENOVATION PIPING REVISION	
RF-BZ	21651	32		C	8/18/69	7/25/72	3	441	400	ADDITION & RENOVATION PLUMBING PLAN & ISO	

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JACOBS ENGINEERING GROUP INC

ROCKY FLATS PLANT
DATA COMPILATION FOR OU 9 - OPWL,

REFERENCE DRAWINGS

DRAWING NO.	SHT NO.	ISSUE	ORIG DATE	REV DATE	OPWL REF	BLDG REF	AREA	DRAWING TITLE	COM
STICK 4									
15501 001	M	E	7/20/83	1/27/93			O	SITE UTILITIES - TITLESHEET	
15501 002	M	N	7/20/83	7/26/90			O	UTILITY LAYOUT - LEGEND SHEET	
15501 003	M	E	7/20/83	6/15/90		A-3	O	SITE UTILITY PLANS	
15501 004	M	F	7/20/83	6/14/90		A-4		SITE UTILITY PLANS	
15501 005	M	H	7/20/83	11/20/90		A-5		SITE UTILITY PLANS	
15501 005	05G	A	10/16/90	10/16/90				VEHICLE STRIPING SITE PLAN	
15501 005	06G	A	10/11/90	10/11/90				PAVEMENT PLAN	
15501 006	M	F	7/20/83	6/14/90		A-6		SITE UTILITY PLANS	
15501 007	M	B	2/26/86	6/14/90		A-7		SITE UTILITY PLANS	
15501 008		B	12/20/66	10/2/68				UTILITY LAYOUT	
15501 009		B	1/30/67	10/2/68		E-3		UTILITY LAYOUT	
15501 010	M	F	7/20/83	6/14/90		B-2		SITE UTILITY PLANS	
15501 011	M	H	7/20/83	7/20/90		B-3		SITE UTILITY PLANS	
15501 011	04H	A	4/5/91	4/5/91				I & E CONTRACTOR SUPPORT TRAILER PLAN & DETS	
15501 012	M	P	7/20/83	11/20/90		B-4		SITE UTILITY PLANS	
15501 013	M	R	7/20/83	7/20/90		B-5		SITE UTILITY PLANS	
15501 014	M	M	7/20/83	7/20/90		B-6		SITE UTILITY PLANS	
15501 015	M	G	7/20/83	7/20/90		B-7		SITE UTILITY PLANS	
15501 016	M	E	7/20/83	7/20/90		B-8		SITE UTILITY PLANS	
15501 017	M	G	7/20/83	6/14/90		C-1		SITE UTILITY PLANS	
15501 017	01F	B	4/6/90	6/15/90				CDH AIR SAMPLING PLTFRM - ELECT POLE INSTALLA	
15501 018	M	H	7/20/83	6/14/90		C-2		UTILITY SITE PLANS	
15501 019	M	P	7/20/83	7/20/90		C-3		SITE UTILITY PLANS	
15501 019	02P	A	3/13/91	3/13/91				INSTALL NEW GATE @ 371 - SITE PLAN & DETAILS	
15501 020	M	R	7/20/83	7/20/90		C-4		SITE UTILITY PLANS	
15501 020	01R	A	4/4/91	4/4/91				SITE UTIL PLANS - BLDG 528 PENETRATION REPAIR	
15501 020	03P	A	5/15/92	5/15/92				INSTALL PHOTO LAB TRAILER - SITE PLAN	
15501 021	M	M	7/20/83	5/14/90		C-5		SITE UTILITY PLANS	
15501 022	M	N	7/20/83	7/20/90		C-6		SITE UTILITY PLANS	
15501 022	1L	A	12/12/89	12/12/89				SHELTERS FOR PONDCRETE/SALTCRETE - ELECT	
15501 023	M	M	7/20/83	6/14/90		C-7		SITE UTILITY PLANS	
15501 024	M	M	7/20/83	6/14/90		C-8		SITE UTILITY PLANS	
15501 025	M	B	7/1/86	7/20/90		D-W1		SITE UTILITY PLANS	
15501 026	M	L	7/20/83	7/20/90		D-1		SITE UTILITY PLANS	

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JACOBS ENGINEERING GROUP INC

ROCKY FLATS PLANT
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DRAWING NO.	SHT NO.	ISSUE	ORIG DATE	REV DATE	OPWL REF	BLDG REF	AREA	DRAWING TITLE	COM
15501 027 M		N	7/20/83	7/20/90		D-2		SITE UTILITY PLANS	
15501 027 01M		C	7/24/90	11/8/90				T100 UTILITIES - SITE UTILITY & LOCATION PLANS	
15501 027 02M		B	6/22/90	11/5/90				T100 UTILITIES - ELECT SITE PLAN - INSTALLATION	
15501 027 03M		D	7/19/90	5/14/91				T100 UTIL - TELEPHONE & ALARM SITE PLAN - INSTALL	
15501 027 01N		A	5/15/91	5/15/91				T100 UTIL - SITE UTILITY & LOCATION PLANS	
15501 027 08N		A	3/18/91	3/18/91				MIDWEST UTILITIES - SEWER LINE SITE PLAN	
15501 027 12N		A	2/4/91	2/4/91				T100 UTIL - ELECTRICAL INSTALLATION SITE PLAN	
15501 028 M		P	7/20/83	7/20/90		D-3		SITE UTILITY PLANS	
15501 028 01M		B	2/19/90	2/21/90				EXT/CON UTIL - CONSTR WINDBREAKS - SITE & UTIL PLAN & WINDBREAKS	
15501 028 02M		B	1/31/90	2/21/90				TRAILERS T334 C & D	
15501 029 M		L	7/20/83	7/20/90		D-4		SITE UTILITY PLANS	
15501 030 M		M	7/20/83	7/20/90		D-5		SITE UTILITY PLANS	
15501 030 01L		A	12/20/89	12/20/89		D-5		SHELTERS FOR PONDCRETE/SALTCRETE T904A TRAILER SITE PLAN	
15501 031 M		M	7/20/83	7/20/90		D-6		SITE UTILITY PLANS	
15501 032 M		L	7/20/83	7/20/90		D-7		SITE UTILITY PLANS	
15501 033 M		L	7/20/83	7/20/90		D-8		SITE UTILITY PLANS	
15501 033 01L		A	1/29/91	1/29/91				RELOCATE T903A TRAILER - INSTALLATION SITE PLAN	
15501 034 M		B	5/1/86	7/20/90		D-16		SITE UTILITY PLANS	
15501 035		M	7/20/83	4/25/86		E-3		SITE UTILITY PLANS	
15501 036		L	7/20/83	8/1/83		E-4		UTILITY LAYOUT	
15501 037		K	7/20/83	8/1/83		E-5		UTILITY LAYOUT	
15501 038 M		B	7/1/86	7/20/90		E-W1		SITE UTILITY PLANS	
15501 038 03B		A	3/16/90	3/16/90				T-130 UTILITIES - TRAILER SITE & UTILITY PLAN	
15501 038 04B		A	3/8/90	3/8/90				T-130 UTIL PHASE III - TRAILER ELECT SITE & LIGHTING PLAN	
15501 038 05B		A	12/7/92	12/7/92				LIGHT POLE MODIFICATION SITE PLAN	
15501 039 M		K	7/20/83	7/20/90		E-1		SITE UTILITY PLANS	
15501 040 M		P	7/20/83	7/20/90		E-2		UTILITY LAYOUT	
15501 041 M		R	7/20/85	7/20/90		E-3		SITE UTILITY PLANS	
15501 041 01P		A	4/30/90	4/30/90				DRAIN DOORWAY - BLDG 444 - PLANS & SECTIONS	
15501 041 02P	5	A	8/29/90	8/29/90				TRAILER T331 DEMOLITION PLAN	
15501 041 03P	8	A	8/29/90	8/29/90				TRAILER T331 SITE PLAN	
15501 041 04P	15	B	8/29/90	9/20/90				ELECT & ALARMS TRAILER T331	
15501 042 M		P	7/20/83	7/20/90		E-4		SITE UTILITY PLANS	
15501 043 M		P	7/20/83	7/20/90		E-5		SITE UTILITY PLANS	
15501 044 M		M	7/20/83	7/20/90		E-6		SITE UTILITY PLANS	

JACOBS ENGINEERING GROUP INC

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DRAWING NO.	SHT NO.	ISSUE	ORIG DATE	REV DATE	OPWL REF	BLDG REF	AREA	DRAWING TITLE	COM
15501 044 02M		A	8/27/92	8/27/92				SITE UTILITY PLANS	
15501 045 M		K	7/20/83	7/20/90		E-7		SITE UTILITY PLANS	
15501 045 02J		A	1/28/91	1/28/91				RELOCATE T903A TRAILER - SITE REMOVAL PLAN	
15501 045 01K		A	8/27/92	8/27/92				SITE UTILITY PLANS	
15501 046 M		E	7/20/83	7/20/90		E-8		SITE UTILITY PLANS	
15501 047		C	7/20/83	8/1/83		F-7		UTILITY LAYOUT	
15501 048		C	7/20/83	8/1/83		F-8		UTILITY LAYOUT	
15501 049 M		L	7/20/83	7/20/90		F-W1		SITE UTILITY PLANS	
15501 050 M		L	7/20/83	7/20/90		F-1		SITE UTILITY PLANS	
15501 051 M		M	7/20/83	7/20/90		F-2		SITE UTILITY PLANS	
15501 052 M		P	7/20/83	7/20/90		F-3		SITE UTILITY PLANS	
15501 053 M		R	7/20/83	7/20/90		F-4		SITE UTILITY PLANS	
15501 054 M		R	7/20/83	7/20/90		F-5		SITE UTILITY PLANS	
15501 055 M		F	7/20/83	7/20/90		F-6		SITE UTILITY PLANS	
15501 056 M		E	7/20/83	7/20/90		F-7		SITE UTILITY PLANS	
15501 057 M		E	7/20/83	7/20/90		F-8		SITE UTILITY PLANS	
15501 059 M		B	5/1/86	7/20/90		G-W8		SITE UTILITY PLANS	
15501 070 M		C	2/9/84	6/8/87				RFAP PLANT VICINITY UTIL, DRAINAGE QUAD A	
15501 071 M		C	2/9/84	6/8/87				RFAP PLANT VICINITY UTIL, DRAINAGE QUAD B	
15501 072 M		C	2/9/84	6/8/87				RFAP PLANT VICINITY UTIL, DRAINAGE QUAD C	
15501 073 M		C	2/9/84	6/8/87				RFAP PLANT VICINITY UTIL, DRAINAGE QUAD D	
15501 074 M		F	2/7/79	6/8/87				RFAO PLANT VICINITY UTILITIES AND DRAINAGE	
15501 101 M		A	10/16/87					AREA PLOT PLAN - PLANT DOM COLD WATER SYS	
15501 102 M		A	10/16/87					AREA PLOT PLAN - PLANT RAW WATER SYS	
15501 103 M		A	10/16/87					AREA PLOT PLAN - PLANT STM & CONDENSATE LINES	
15501 104 M		A	10/16/87					AREA PLOT PLAN - PLANT SANITARY SEWER SYS	
15501 105 M		A	10/16/87					AREA PLOT PLAN - PLANT NATURAL GAS LINES	
15501 106 M		A	10/16/87					AREA PLOT PLAN - PLANT LIQUID NITROGEN	
15501 107 M		A	10/16/87					AREA PLOT PLAN - PLANT ELECTRICAL SYSTEM	
15501 108 M		A	10/16/87					AREA PLOT PLAN - PLANT LAN LINES	
15501 109 M		A	10/16/87					AREA PLOT PLAN - PLANT DOM COLD WATER SYS	

APPENDIX F

Programmatic Risk-Based Preliminary Remediation Goals
Rocky Flats Environmental Technology Site

PROGRAMMATIC RISK-BASED PRELIMINARY REMEDIATION GOALS

U.S. Department of Energy
Rocky Flats Plant
Golden, Colorado

Final
Revision 1

October 1994

TABLE 26

PROGRAMMATIC PRGs FOR ROCKY FLATS PLANT

Target Analyte List Chemical	Residential Groundwater (mg/L)	Residential Surface Water Swimming (mg/L)	Residential Soil (mg/kg)	Office Worker Soil (mg/kg)	Construction Worker Subsurface Soil (mg/kg)	Wading Ecological Worker (mg/L)	Soil Ecological Worker (mg/kg)
Acenaphthene#	2.19E+00	1.68E+03	1.65E+04	1.23E+05	1.06E+05	4.38E+03	1.48E+05
Acenaphthylene#	–	–	–	–	–	–	–
Acetone#	3.65E+00	2.81E+03	2.74E+04	2.04E+05	1.77E+05	7.30E+03	2.47E+05
Aldrin	5.00E-06	3.85E-03	3.77E-02	3.36E-01	7.30E+00	1.20E-01	4.07E-01
Aluminum	–	–	–	–	–	–	–
Anthracene#	1.09E+01	8.42E+03	8.23E+04	6.13E+05	5.32E+05	2.19E+04	7.41E+05
Antimony	1.46E-02	1.12E+01	1.10E+02	8.18E+02	7.10E+02	2.92E+01	9.87E+02
Aroclor-1016	2.55E-03	1.97E+00	1.92E+01	1.43E+02	1.24E+02	5.11E+00	1.73E+02
Aroclor-1221	1.10E-05	8.51E-03	8.32E-02	7.43E-01	1.61E+01	2.65E-01	8.98E-01
Aroclor-1232	1.10E-05	8.51E-03	8.32E-02	7.43E-01	1.61E+01	2.65E-01	8.98E-01
Aroclor-1242	1.10E-05	8.51E-03	8.32E-02	7.43E-01	1.61E+01	2.65E-01	8.98E-01
Aroclor-1248	1.10E-05	8.51E-03	8.32E-02	7.43E-01	1.61E+01	2.65E-01	8.98E-01
Aroclor-1254	1.10E-05	8.51E-03	8.32E-02	7.43E-01	1.61E+01	2.65E-01	8.98E-01
Aroclor-1260	1.10E-05	8.51E-03	8.32E-02	7.43E-01	1.61E+01	2.65E-01	8.98E-01
Arsenic	4.86E-05	3.74E-02	3.66E-01	3.27E+00	7.09E+01	1.17E+00	3.95E+00
Barium	2.56E+00	1.97E+03	1.91E+04	1.41E+05	1.24E+05	5.11E+03	1.73E+05
Benzene#	6.15E-04	2.26E+00	2.21E+01	1.66E-01	2.18E+00	7.05E+01	2.38E+02
alpha-BHC	1.35E-05	1.04E-02	1.02E-01	9.08E-01	1.97E+01	3.24E-01	1.10E+00
beta-BHC	4.72E-05	3.64E-02	3.56E-01	3.18E+00	6.90E+01	1.14E+00	3.84E+00
delta-BHC	–	–	–	–	–	–	–
gamma-BHC (Lindane)	6.54E-05	5.04E-02	4.93E-01	4.40E+00	9.55E+01	1.57E+00	5.32E+00
Benzo(a)anthracene	1.16E-04	8.97E-02	8.77E-01	7.84E+00	1.70E+02	2.80E+00	9.47E+00
Benzo(a)pyrene	1.16E-05	8.97E-03	8.77E-02	7.84E-01	1.70E+01	2.80E-01	9.47E-01
Benzo(b)fluoranthene	1.16E-04	8.97E-02	8.77E-01	7.84E+00	1.70E+02	2.80E+00	9.47E+00
Benzo(g,h,i)perylene	–	–	–	–	–	–	–
Benzo(k)fluoranthene	1.16E-03	8.97E-01	8.77E+00	7.84E+01	1.70E+03	2.80E+01	9.47E+01
Benzoic Acid	1.46E+02	1.12E+05	1.10E+06	8.18E+06	7.10E+06	2.92E+05	9.87E+06
Benzyl Alcohol	1.09E+01	8.42E+03	8.23E+04	6.13E+05	5.32E+05	2.19E+04	7.41E+05
Beryllium	1.98E-05	1.52E-02	1.49E-01	1.33E+00	2.89E+01	4.75E-01	1.61E+00
bis(2-Chloroethoxy)methane#	–	–	–	–	–	–	–
bis(2-Chloroethyl)ether#	1.63E-05	5.95E-02	5.82E-01	6.29E+00	1.13E+02	1.86E+00	6.28E+00
bis(2-Chloroisopropyl)ether#	4.22E-04	9.36E-01	9.15E+00	4.00E-01	1.77E+03	2.92E+01	9.87E+01
bis(2-Ethylhexyl)phthalate	6.07E-03	4.68E+00	4.57E+01	4.09E+02	8.87E+03	1.46E+02	4.94E+02
Bromodichloromethane#	1.37E-03	1.06E+00	1.03E+01	3.55E-01	3.55E+04	3.30E+01	1.11E+02
Bromoform#	3.77E-03	8.29E+00	8.11E+01	4.52E-02	4.75E+01	2.59E+02	8.75E+02
Bromomethane#	1.09E-02	3.93E+01	3.84E+02	2.86E+03	2.48E+03	1.02E+02	3.46E+03

TABLE 26

PROGRAMMATIC PRGs FOR ROCKY FLATS PLANT

Target Analyte List Chemical	Residential Groundwater (mg/L)	Residential Surface Water Swimming (mg/L)	Residential Soil (mg/kg)	Office Worker Soil (mg/kg)	Construction Worker Subsurface Soil (mg/kg)	Wading Ecological Worker (mg/L)	Soil Ecological Worker (mg/kg)
4-Bromophenyl phenyl ether	–	–	–	–	–	–	–
2-Butanone#	2.47E+00	1.68E+04	1.65E+05	1.23E+06	1.06E+06	4.38E+04	1.48E+06
Butylbenzylphthalate	7.30E+00	5.62E+03	5.49E+04	4.09E+05	3.55E+05	1.46E+04	4.94E+05
Cadmium	1.82E-02	1.40E+01	1.37E+02	1.02E+03	8.87E+02	3.65E+01	1.23E+03
Calcium	–	–	–	–	–	–	–
Carbon disulfide#	2.76E-02	2.81E+03	2.74E+04	2.04E+05	1.77E+05	7.30E+03	2.47E+05
Carbon tetrachloride#	2.60E-04	5.04E-01	4.93E+00	4.40E+01	6.82E-01	1.57E+01	5.32E+01
Cesium	–	–	–	–	–	–	–
alpha-Chlordane	6.54E-05	5.04E-02	4.93E-01	4.40E+00	9.55E+01	1.57E+00	5.32E+00
beta-Chlordane	6.54E-05	5.04E-02	4.93E-01	4.40E+00	9.55E+01	1.57E+00	5.32E+00
gamma-Chlordane	6.54E-05	5.04E-02	4.93E-01	4.40E+00	9.55E+01	1.57E+00	5.32E+00
4-Chloroaniline	1.46E-01	1.12E+02	1.10E+03	8.18E+03	7.10E+03	2.92E+02	9.87E+03
Chlorobenzene#	5.16E-02	5.62E+02	5.49E+03	4.09E+04	3.55E+04	1.46E+03	4.94E+04
Chloroethane#	2.78E+01	–	–	–	1.18E+03	–	–
Chloroform#	2.76E-04	1.07E+01	1.05E+02	3.49E-02	6.61E-01	3.35E+02	1.13E+03
Chloromethane#	2.32E-03	5.04E+00	4.93E+01	7.44E-02	9.55E+03	1.57E+02	5.32E+02
4-Chloro-3-methylphenol	–	–	–	–	–	–	–
2-Chloronaphthalene#	2.92E+00	2.25E+03	2.20E+04	1.64E+05	1.42E+05	5.84E+03	1.97E+05
2-Chlorophenol#	1.82E-01	1.40E+02	1.37E+03	1.02E+04	8.87E+03	3.65E+02	1.23E+04
4-Chlorophenyl phenyl ether	–	–	–	–	–	–	–
Chromium III	3.65E+01	2.81E+04	2.74E+05	2.04E+06	1.77E+06	7.30E+04	2.47E+06
Chromium VI	1.82E-01	1.40E+02	1.37E+03	4.76E+03	8.87E+03	3.65E+02	1.23E+04
Chyrsene	1.16E-02	8.97E+00	8.77E+01	7.84E+02	1.70E+04	2.80E+02	9.47E+02
Cobalt	–	–	–	–	–	–	–
Copper	1.46E+00	1.12E+03	1.10E+04	8.18E+04	7.10E+04	2.92E+03	9.87E+04
Cyanide	7.30E-01	5.62E+02	5.49E+03	4.09E+04	3.55E+04	1.46E+03	4.94E+04
4,4-DDD	3.54E-04	2.73E-01	2.67E+00	2.38E+01	5.17E+02	8.52E+00	2.88E+01
4,4-DDE	2.50E-04	1.93E-01	1.88E+00	1.68E+01	3.65E+02	6.01E+00	2.03E+01
4,4-DDT	2.50E-04	1.93E-01	1.88E+00	1.68E+01	3.65E+02	6.01E+00	2.03E+01
Dibenz(a,h)anthracene	1.16E-05	8.97E-03	8.77E-02	7.84E-01	1.70E+01	2.80E-01	9.47E-01
Dibenzofuran	–	–	–	–	–	–	–
Dibromochloromethane	1.01E-03	7.80E-01	7.62E+00	6.81E+01	1.48E+03	2.43E+01	8.23E+01
Di-n-butylphthalate	3.65E+00	2.81E+03	2.74E+04	2.04E+05	1.77E+05	7.30E+03	2.47E+05
1,2-Dichlorobenzene#	4.67E-01	2.53E+03	2.47E+04	1.84E+05	1.60E+05	6.57E+03	2.22E+05
1,3-Dichlorobenzene#	–	–	–	–	–	–	–
1,4-Dichl[illegible]nzene#	3.54E-03	2.73E+00	2.67[illegible]	1.37E-01	5.17E+03	8.52E+01	2.[illegible]E+02
3,3-Dichlo[illegible]enzidine	1.89E-04	1.46E-01	1.42[illegible]	1.27E+01	2.76E+02	4.54E+00	[illegible]+01

TABLE 26

PROGRAMMATIC PRGs FOR ROCKY FLATS PLANT

Target Analyte List Chemical	Residential Groundwater (mg/L)	Residential Surface Water Swimming (mg/L)	Residential Soil (mg/kg)	Office Worker Soil (mg/kg)	Construction Worker Subsurface Soil (mg/kg)	Wading Ecological Worker (mg/L)	Soil Ecological Worker (mg/kg)
1,1-Dichloroethane#	1.01E+00	2.81E+03	2.74E+04	2.04E+05	8.54E+01	7.30E+03	2.47E+05
1,2-Dichloroethane#	1.97E-04	7.20E-01	7.04E+00	5.21E-01	6.67E-01	2.25E+01	7.60E+01
1,1-Dichloroethene#	6.77E-05	1.09E-01	1.07E+00	3.43E+00	1.27E-01	3.41E+00	1.15E+01
1,2-Dichloroethene (total)#	3.28E-01	2.53E+02	2.47E+03	1.84E+04	1.60E+04	6.57E+02	2.22E+04
2,4-Dichlorophenol	1.10E-01	8.42E+01	8.23E+02	6.13E+03	5.32E+03	2.19E+02	7.41E+03
1,2-Dichloropropane#	1.25E-03	9.63E-01	9.42E+00	3.89E-01	1.83E+03	3.01E+01	1.02E+02
cis-1,3-Dichloropropene#	1.27E-04	3.64E-01	3.56E+00	1.03E+00	5.32E+02	1.14E+01	3.84E+01
trans-1,3-Dichloropropene#	1.27E-04	3.64E-01	3.56E+00	1.03E+00	5.32E+02	1.14E+01	3.84E+01
Dieldrin	5.31E-06	4.09E-03	4.00E-02	3.57E-01	7.76E+00	1.28E-01	4.32E-01
Diethylphthalate	2.92E+01	2.25E+04	2.20E+05	1.64E+06	1.42E+06	5.84E+04	1.97E+06
2,4-Dimethylphenol#	7.30E-01	5.62E+02	5.49E+03	4.09E+04	3.55E+04	1.46E+03	4.94E+04
Dimethylphthalate	3.65E+02	2.81E+05	2.74E+06	2.04E+07	1.77E+07	7.30E+05	2.47E+07
4,6-Dinitro-2-methylphenol#	-	-	-	-	-	-	-
2,4-Dinitrophenol	7.30E-02	5.62E+01	5.49E+02	4.09E+03	3.55E+03	1.46E+02	4.94E+03
2,4-Dinitrotoluene	7.30E-02	5.62E+01	5.49E+02	4.09E+03	3.55E+03	1.46E+02	4.94E+03
2,6-Dinitrotoluene	3.65E-02	9.63E-02	9.42E-01	8.41E+00	1.83E+02	3.01E+00	1.02E+01
Di-n-octylphthalate	7.30E-01	4.68E+00	4.57E+01	4.09E+02	8.87E+03	1.46E+02	4.94E+02
Endosulfan I	2.19E-01	1.68E+02	1.65E+03	1.23E+04	1.06E+04	4.38E+02	1.48E+04
Endosulfan II	2.19E-01	1.68E+02	1.65E+03	1.23E+04	1.06E+04	4.38E+02	1.48E+04
Endosulfan sulfate	2.19E-01	1.68E+02	1.65E+03	1.23E+04	1.06E+04	4.38E+02	1.48E+04
Endosulfan (technical)	2.19E-01	1.68E+02	1.65E+03	1.23E+04	1.06E+04	4.38E+02	1.48E+04
Endrin ketone	-	-	-	-	-	-	-
Endrin (technical)	1.09E-02	8.42E+00	8.23E+01	6.13E+02	5.32E+02	2.19E+01	7.41E+02
Ethylbenzene#	1.58E+00	2.81E+03	2.74E+04	2.04E+05	1.00E+03	7.30E+03	2.47E+05
Fluoranthene	1.46E+00	1.12E+03	1.10E+04	8.18E+04	7.10E+04	2.92E+03	9.87E+04
Fluorene#	1.46E+00	1.12E+03	1.10E+04	8.18E+04	7.10E+04	2.92E+03	9.87E+04
Heptachlor	1.89E-05	1.46E-02	1.42E-01	1.27E+00	2.76E+01	4.54E-01	1.54E+00
Heptachlor epoxide	9.34E-06	7.20E-03	7.04E-02	6.29E-01	1.36E+01	2.25E-01	7.60E-01
Hexachlorobenzene	5.31E-05	4.09E-02	4.00E-01	3.57E+00	7.76E+01	1.28E+00	4.32E+00
Hexachlorobutadiene	-	-	-	7.33E+01	3.55E+02	-	-
Hexachlorocyclopentadiene	2.56E-01	1.97E+02	1.91E+03	1.42E+04	1.24E+04	5.11E+02	1.73E+04
Hexachloroethane	6.07E-03	4.68E+00	4.57E+01	4.09E+02	1.77E+03	7.30E+01	4.94E+02
2-Hexanone#	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	1.16E-04	8.97E-02	8.77E-01	7.84E+00	1.70E+02	2.80E+00	9.47E+00
Iron	-	-	-	-	-	-	-
Isophorone	8.95E-02	6.89E+01	6.74E+02	6.02E+03	1.31E+05	2.15E+03	7.28E+03
Lead	-	-	-	-	-	-	-

TABLE 26

PROGRAMMATIC PRGs FOR ROCKY FLATS PLANT

Target Analyte List Chemical	Residential Groundwater (mg/L)	Residential Surface Water Swimming (mg/L)	Residential Soil (mg/kg)	Office Worker Soil (mg/kg)	Construction Worker Subsurface Soil (mg/kg)	Wading Ecological Worker (mg/L)	Soil Ecological Worker (mg/kg)
Lithium	–	–	–	–	–	–	–
Magnesium	–	–	–	–	–	–	–
Manganese	1.82E–01	1.40E+02	1.36E+03	1.01E+04	8.86E+03	3.65E+02	1.23E+04
Mercury	1.09E–02	8.42E+00	8.23E+01	6.13E+02	5.32E+02	2.19E+01	7.41E+02
Methoxychlor	1.82E–01	1.40E+02	1.37E+03	1.02E+04	8.87E+03	3.65E+02	1.23E+04
Methylene chloride#	6.22E–03	8.73E+00	8.54E+01	4.29E–02	1.66E+04	2.73E+02	9.22E+02
2–Methylnaphthalene#	–	–	–	–	–	–	–
4–Methyl–2–pentanone#	2.03E–01	2.25E+03	2.20E+04	1.64E+05	1.42E+05	5.84E+03	1.97E+05
2–Methylphenol	1.83E+00	1.40E+03	1.37E+04	1.02E+05	8.87E+04	3.65E+03	1.23E+05
4–Methylphenol	–	–	–	–	–	–	–
Molybdenum	1.82E–01	1.40E+02	1.37E+03	1.02E+04	8.87E+03	3.65E+02	1.23E+04
Naphthalene#	–	–	–	–	–	–	–
Nickel	7.30E–01	5.62E+02	5.49E+03	4.09E+04	3.55E+04	1.46E+03	4.94E+04
2–Nitroaniline	–	–	–	–	–	–	–
3–Nitroaniline	–	–	–	–	–	–	–
4–Nitroaniline	–	–	–	–	–	–	–
Nitrobenzene#	4.20E–03	1.40E+01	1.37E+02	1.02E+03	8.87E+02	3.65E+01	1.23E+03
2–Nitrophenol	–	–	–	–	–	–	–
4–Nitrophenol#	–	–	–	–	–	–	–
n–Nitrosodiphenylamine#	1.73E–02	1.34E+01	1.31E+02	2.80E–02	2.53E+04	4.17E+02	1.41E+03
n–Nitrosodipropylamine	1.21E–05	9.36E–03	9.15E–02	8.17E–01	1.77E+01	2.92E–01	9.87E–01
Pentachlorophenol	7.08E–04	5.46E–01	5.34E+00	4.77E+01	1.03E+03	1.70E+01	5.76E+01
Phenanthrene#	–	–	–	–	–	–	–
Phenol	2.19E+01	1.68E+04	1.65E+05	1.23E+06	1.06E+06	4.38E+04	1.48E+06
Potassium	–	–	–	–	–	–	–
Pyrene	1.09E+00	8.42E+02	8.23E+03	6.13E+04	5.32E+04	2.19E+03	7.41E+04
Selenium	1.82E–01	1.40E+02	1.37E+03	1.02E+04	8.87E+03	3.65E+02	1.23E+04
Silver	1.82E–01	1.40E+02	1.37E+03	1.02E+04	8.87E+03	3.65E+02	1.23E+04
Sodium	–	–	–	–	–	–	–
Strontium	2.19E+01	1.68E+04	1.65E+05	1.23E+06	1.06E+06	4.38E+04	1.48E+06
Stryene#	2.01E+00	5.62E+03	5.49E+04	4.09E+05	5.40E+02	1.46E+04	4.94E+05
1,1,2,2–Tetrachloroethane#	8.95E–05	3.28E–01	3.20E+00	1.14E+00	6.21E+02	1.02E+01	3.46E+01
Tetrachloroethene#	1.63E–03	1.26E+00	1.23E+01	2.97E–01	1.77E+04	3.93E+01	1.33E+02
Thallium	–	–	–	–	–	–	–
Tin	2.19E+01	1.68E+04	1.65E+05	1.23E+06	1.06E+06	4.38E+04	1.48E+06
Toluene#	9.65E–01	5.62E+03	5.49E+04	4.09E+05	1.95E+02	1.46E+04	4.94E+05
Toxaphen	7.73E–05	5.95E–02	5.8[illegible]01	5.20E+00	1.13E+02	1.86E+00	[illegible]E+00

TABLE 26

PROGRAMMATIC PRGs FOR ROCKY FLATS PLANT

Target Analyte List Chemical	Residential Groundwater (mg/L)	Residential Surface Water Swimming (mg/L)	Residential Soil (mg/kg)	Office Worker Soil (mg/kg)	Construction Worker Subsurface Soil (mg/kg)	Wading Ecological Worker (mg/L)	Soil Ecological Worker (mg/kg)
1,2,4-Trichlorobenzene#	2.19E-01	2.81E+02	2.74E+03	2.04E+04	1.77E+04	7.30E+02	2.47E+04
1,1,1-Trichloroethane#	-	-	-	-	-	-	-
1,1,2-Trichloroethane#	3.18E-04	1.15E+00	1.12E+01	3.26E-01	2.18E+03	3.59E+01	1.21E+02
Trichloroethene#	-	-	-	-	-	-	-
2,4,5-Trichlorophenol	3.65E+00	2.81E+03	2.74E+04	2.04E+05	1.77E+05	7.30E+03	2.47E+05
2,4,6-Trichlorophenol	7.73E-03	5.95E+00	5.82E+01	5.20E+02	1.13E+04	1.86E+02	6.28E+02
Vanadium	2.56E-01	1.97E+02	1.92E+03	1.43E+04	1.24E+04	5.11E+02	1.73E+04
Vinyl acetate	3.65E+01	2.81E+04	2.74E+05	2.04E+06	1.77E+06	7.30E+04	2.47E+06
Vinyl chloride#	2.81E-05	3.45E-02	3.37E-01	1.09E+01	3.46E-02	1.08E+00	3.64E+00
Xylene (total)#	7.30E+01	5.62E+04	5.49E+05	4.09E+06	3.55E+06	1.46E+05	4.94E+06
Zinc	1.09E+01	8.42E+03	8.23E+04	6.13E+05	5.32E+05	2.19E+04	7.41E+05
Nitrate	5.84E+01	4.49E+04	4.39E+05	3.27E+06	2.84E+06	1.17E+05	3.95E+06
Nitrite	3.65E+00	2.81E+03	2.74E+04	2.04E+05	1.77E+05	7.30E+03	2.47E+05
pH	-	-	-	-	-	-	-
Sulfide	-	-	-	-	-	-	-
Ammonium	-	-	-	-	-	-	-
Bicarbonate	-	-	-	-	-	-	-
Bromide	-	-	-	-	-	-	-
Carbonate	-	-	-	-	-	-	-
Chloride	-	-	-	-	-	-	-
Cyanide	-	-	-	-	-	-	-
Fluoride	2.19E+00	1.68E+03	1.65E+04	1.23E+05	1.06E+05	4.38E+03	1.48E+05
Orthophosphate	-	-	-	-	-	-	-
Silica (as Si and SiO_2)	-	-	-	-	-	-	-
Sulfate	-	-	-	-	-	-	-
Americium-241	1.98E-01 *	1.53E+02 *	2.37E+00 **	9.55E+00 **	2.16E+02 **	4.76E+03 *	1.09E+01 **
Cesium-137	1.70E+00 *	1.31E+03 *	2.83E+01 **	1.14E+02 **	2.48E+03 **	4.08E+04 *	1.38E+02 **
Plutonium-239	2.07E-01 *	1.59E+02 *	3.43E+00 **	1.38E+01 **	3.01E+02 **	4.97E+03 *	1.67E+01 **
Plutonium-240	2.07E-01 *	1.59E+02 *	3.42E+00 **	1.38E+01 **	3.01E+02 **	4.97E+03 *	1.67E+01 **
Radium-226	3.97E-01 *	3.05E+02 *	2.28E+00 **	9.13E+00 **	2.17E+02 **	9.52E+03 *	9.70E+00 **
Radium-228	4.76E-01 *	3.66E+02 *	7.93E+00 **	3.20E+01 **	6.94E+02 **	1.14E+04 *	3.86E+01 **
Strontium-89	1.59E+01 *	1.22E+04 *	6.64E+01 **	2.66E+02 **	6.41E+03 **	3.81E+05 *	2.78E+02 **
Strontium-90	1.44E+00 *	1.11E+03 *	2.40E+01 **	9.70E+01 **	2.10E+03 **	3.46E+04 *	1.17E+02 **

TABLE 26
PROGRAMMATIC PRGs FOR ROCKY FLATS PLANT

Target Analyte List Chemical	Residential Groundwater (mg/L)	Residential Surface Water Swimming (mg/L)	Residential Soil (mg/kg)	Office Worker Soil (mg/kg)	Construction Worker Subsurface Soil (mg/kg)	Wading Ecological Worker (mg/L)	Soil Ecological Worker (mg/kg)
Tritium	–	–	–	–	–	–	–
Uranium−233	2.98E+00 *	2.29E+03 *	4.47E+01 **	1.82E+02 **	4.13E+03 **	7.14E+04 *	2.18E+02 **
Uranium−234	2.98E+00 *	2.29E+03 *	4.53E+01 **	1.85E+02 **	4.18E+03 **	7.14E+04 *	2.22E+02 **
Uranium−235	2.98E+00 *	2.29E+03 *	1.73E−01 **	6.92E−01 **	1.73E+01 **	7.14E+04 *	6.92E−01 **
Uranium−238	2.98E+00 *	2.29E+03 *	4.60E+01 **	1.87E+02 **	4.22E+03 **	7.14E+04 *	2.25E+02 **

NOTE: PPRGs listed are the minimum of the noncarcinogenic (RfD) and the carcinogenic (SF) PRG.
= Chemicals listed are volatile.
* = Values given are in units of pCi/L.
** = Values given are in units of pCi/g.

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APPENDIX G

Investigation Requirements and Proposed Actions

G-1

APPENDIX G
TABLE G-1
INVESTIGATION REQUIREMENTS AND PROPOSED ACTIONS FOR STAGE I FIELD ACTIVITIES
(IHSS 121, Original Process Waste Lines)

INTER-AGENCY AGREEMENT REQUIRED ACTION	OU9 WORK PLAN REQUIRED ACTION	OU9 PROPOSED ACTION FOR OPWL FIELD INVESTIGATION
All Pipelines (IHSS 121, Original Process Waste Lines) 1. Close the regulated units in accordance with this Agreement and the regulations. (1. As required by Section I.B.11 of the SOW.) 2. Submit Phase I and Phase II RFI/RI reports documenting investigations for each site in accordance with the schedules within Table 6 of this Attachment. The Phase I and Phase II reports shall at a minimum contain information to characterize the nature, rate, and extent of contamination; define pathways and methods of migration; identify areas threatened by release from the facility; and determine short- and long- term threats to human health and the environment. (Submit RFI/RI Workplans in accordance with Section I.B.11 and Table 6 of the SOW. Submit the required reports and close the units in accordance with the schedules in Table 6 of the SOW.) 3. Submit all Phase I and Phase II Closure/Interim Measure/Interim Remedial Action reports as required by Section I.B.11 of the SOW and in accordance with the schedule requirements within Table 6 of the SOW.	Pipelines 1. Where structural features are absent or widely spaced, pipeline will be located using pipeline location devices such as electrical conductance, ground-penetrating radar (GPR), transmitting sounde, and video surveys. Some pipelines will be pressure tested to determine current status of the pipeline, where possible. 2. An HPGe surface radiation survey of the surface soils will be conducted at areas where released wastes impacted surface soils according to FO.16, Field Radiological Measurements. 3. A surface soil sample will be collected from each test pit before excavating using the grab sample method as described in OP GT.8. The sample locations will be as close as possible to the center of the area to be excavated. Overlying pavement will be removed if necessary. The surface soil sample will consist of a 6-inch square area sampled to a depth of 6 inches. 4. Test pits will be excavated according to the applicable portions of OP GT.7, Logging and Sampling of Test Pits and Trenches. Completion of excavation permitting procedures are described in OP GT.10, Borehole Clearing. One discrete sample will be collected in trench backfill directly beneath the pipeline and in native soil directly below trench.	Pipelines 1. Where structural features are absent or widely spaced, pipeline will be located using pipeline location devices such as electromagnetic inductive/conductive tracing, ground-penetrating radar (GPR), transmitting sounde, video surveys and excavation of test pits. 2. An HPGe surface radiation survey of the surface soils will be conducted at areas where released wastes impacted surface soils according to FO.16, Field Radiological Measurements. A sodium iodide radiation survey will be conducted at areas indicated as "hot spots" by the HPGe survey to further delineate areas of surface contamination. 3. A surface soil sample will be collected from each test area before conducting subsurface soil sampling using the grab sample method as described in OP GT.8. The sample locations will be as close as possible to the center of the area to be investigated. Overlying pavement will be removed if necessary. 4. Test pits will be excavated according to the applicable portions of OP GT.7, Logging and Sampling of Test Pits and Trenches. If test pits are not feasible to be excavated, subsurface soil samples will be obtained using a variety of other methods that include: hand augering, borehole drilling (OP GT.02), or driving a geoprobe (OP GT.22). Permitting of excavation and borehole drilling will be according to OP GT.10, Borehole Clearing.

APPENDIX G
TABLE G-1 (continued)
INVESTIGATION REQUIREMENTS AND PROPOSED ACTIONS FOR STAGE I FIELD ACTIVITIES
(IHSS 121, Original Process Waste Lines)

INTER-AGENCY AGREEMENT REQUIRED ACTION	OU9 WORK PLAN REQUIRED ACTION	OU9 PROPOSED ACTION FOR OPWL FIELD INVESTIGATION
	5. One sample of pipeline residue will be collected where feasible. If no residue is present, one wipe sample will be collected from the interior surface of pipeline components according to OP FO.16, Field Radiological Measurements. An inside surface radiological dose rate measurement will be obtained by inserting a low energy gamma probe radiation detector into the pipeline. 6. If ground is encountered in a test pit, a groundwater grab sample will be collected according to OP SW.3, Surface Water Sampling. No attempt will be made to open pipelines and collect residue samples. The trench backfill directly below the pipeline will be sampled, if possible, but the native soil directly below the trench will not be sampled. 7. If pipeline has been physically removed, test pits will be excavated or boreholes will be drilled using a hand auger or a drilling rig. Samples will be collected from the bottom of the former pipeline trench and the native soil directly below the trench. GPR may be used to locate the alignments of these pipelines.	If test pits are excavated, one discrete soil sample will be collected in the trench backfill directly beneath the pipeline, in native soil directly below trench and mid-depth between trench bottom and water table/bedrock. In addition, one discrete groundwater sample will be collected for each test area where feasible. One sample of the pipeline residue will also be collected where feasible. If no residue is present, one wipe sample will be collected from the interior surface of the pipeline components according to OP FO.16. An inside surface radiological dose rate measurement will be obtained by inserting a low energy gamma probe radiation detector into the pipeline. 5. If boreholes or hydraulic sampling methods are used, one discrete sample will be collected at the following locations: (a) ground surface before drilling; (b) in trench soil backfill near the bottom of the trench; (c) in native soil directly below the trench; (d) in native soil mid-depth between the trench bottom and the water table or bedrock, whichever is encountered first; (e) in bedrock at the bedrock/alluvium contact if groundwater is not encountered above the contact (i.e., where the vadose zone extends to the bedrock/alluvium contact).

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APPENDIX G
TABLE G-1 (continued)
INVESTIGATION REQUIREMENTS AND PROPOSED ACTIONS FOR STAGE I FIELD ACTIVITIES
(IHSS 121, Original Process Waste Lines)

INTER-AGENCY AGREEMENT REQUIRED ACTION	OU9 WORK PLAN REQUIRED ACTION	OU9 PROPOSED ACTION FOR OPWL FIELD INVESTIGATION
	Valve Vaults 1. Valve vaults will be visually inspected to assess their integrity. 2. One residue sample or one wipe sample if no residue is present will be collected from each valve vault. In addition, a surface radiological dose rate measurement will be obtained by inserting a low energy gamma radiation probe detector into the vault in accordance with OP FO.16.	6. If groundwater is encountered in a test pit, a groundwater grab sample will be collected according to OP SW.3, Surface Water Sampling. If groundwater is encountered in a borehole or geoprobe, a groundwater grab sample will be collected in accordance with OP GW.06. No attempt will be made to open pipelines and collect residue samples where groundwater is present. In this instance, the trench backfill directly below the pipeline will be sampled, if possible, but the native soil directly below the trench will not be sampled. 7. In order to supplement the pipeline integrity evaluation, additional confirmation soil samples will be collected using hydraulic sampling methods (e.g., geoprobes) that will be located on 25-foot centers from one test area to the next. Soil and groundwater samples will be collected at the same target locations as described above for borehole/hydraulic sampling methods. 8. If pipeline has been physically removed, test pits will be excavated or boreholes or hydraulic sampling methods will be advanced and samples collected at the following locations: (a) ground surface before drilling; (b) in trench backfill near the bottom of the trench; (c) in native soil directly below the trench; (d) in native soil mid-depth between the trench bottom and the water table or bedrock, whichever is encountered first; (e) in bedrock at the bedrock/alluvium contact if groundwater is not encountered above the contact (i.e., where the vadose zone extends to the bedrock/alluvium contact). GPR may be used to locate the alignments of these pipelines.

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APPENDIX G
TABLE G-1 (continued)
INVESTIGATION REQUIREMENTS AND PROPOSED ACTIONS FOR STAGE I FIELD ACTIVITIES
(IHSS 121, Original Process Waste Lines)

INTER-AGENCY AGREEMENT REQUIRED ACTION	OU9 WORK PLAN REQUIRED ACTION	OU9 PROPOSED ACTION FOR OPWL FIELD INVESTIGATION
		Valve Vaults 1. Valve vaults will be visually inspected to assess their integrity. 2. One residue sample or one wipe sample if no residue is present will be collected from each valve vault. In addition, a surface radiological dose rate measurement will be obtained by inserting a low energy gamma radiation probe detector into the vault in accordance with OP FO.16.

Notes:

FIDLER = Field Instrument for the Detection of Low Energy Radiation
G-M =
GPR = Ground Penetrating Radar
HPGe = high purity germanium
HSL = hazardous substance list
NaI = sodium iodide

OP = EMD Operating Procedure
OPWL = Original Process Waste Lines
OU = Operable Unit
RFI = Remedial Facility Investigation
RI = Remedial Investigation
SOP = Standard Operating Procedure

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APPENDIX G
TABLE G-2
INVESTIGATION REQUIREMENTS AND PROPOSED ACTIONS FOR STAGE I FIELD ACTIVITIES
PIPELINES P-12, P-13, P-14, P-15
(IHSSs 123.1, 123.2, Valve Vault 7, and West of Bldg. 70)

INTER-AGENCY AGREEMENT REQUIRED ACTION	OU9 WORK PLAN REQUIRED ACTION	OU9 PROPOSED ACTION FOR OPWL FIELD INVESTIGATION
Pipelines P-12, P-13, P-14, P-15 (IHSS 123.1, 123.2 Valve Vault 7, and West of Bldg. 70) 1. Submit the report(s) documenting the radiometric survey conducted from 1975 - 1983. 2. Submit a radiation survey using a G-M shielded pancake detector and sideshielded FIDLER of sites 123.1 and 123.2. The survey method shall be proposed within the Workplan for this OU. If "hotspots" are detected, the grid must be tightened to locate the source of the radiation. 3. Conduct a soil sampling survey of the areas affected by sites 123.1 and 123.2. Four soil bores will be placed around each vault associated with site 123 and shall be drilled to a depth 10 feet below the bottom of each vault. All Pipelines Soil samples shall be composited to define each 2-foot interval of soil and analyzed for HSL volatiles. Soil samples shall also be composited to define 6-foot intervals and will be analyzed for nitrates, fluorides, beryllium, total uranium, total plutonium, gross alpha, and gross beta.	Pipelines 1. Where structural features are absent or widely spaced, pipeline will be located using pipeline location devices such as electrical conductance, ground-penetrating radar (GPR), transmitting sounde, and video surveys. Some pipelines will be pressure tested to determine current status of the pipeline, where possible. 2. An HPGe surface radiation survey of the surface soils will be conducted at areas where released wastes impacted surface soils according to FO.16, Field Radiological Measurements. 3. A surface soil sample will be collected from each test pit before excavating using the grab sample method as described in OP GT.8. The sample locations will be as close as possible to the center of the area to be excavated. Overlying pavement will be removed if necessary. The surface soil sample will consist of a 6-inch square area sampled to a depth of 6 inches.	Pipelines 1. Where structural features are absent or widely spaced, pipeline will be located using pipeline location devices such as electromagnetic inductive/conductive tracing, ground-penetrating radar (GPR), transmitting sounde, video surveys and excavation of test pits. 2. An HPGe surface radiation survey of the surface soils will be conducted at areas where released wastes impacted surface soils according to FO.16, Field Radiological Measurements. A sodium iodide radiation survey will be conducted at areas indicated as "hot spots" by the HPGe survey to further delineate areas of surface contamination. 3. A surface soil sample will be collected from each test area before conducting subsurface soil sampling using the grab sample method as described in OP GT.8. The sample locations will be as close as possible to the center of the area to be investigated. Overlying pavement will be removed if necessary. 4. Test pits will be excavated according to the applicable portions of OP GT.7, Logging and Sampling of Test Pits and Trenches. If test pits are not feasible to be excavated, subsurface soil samples will be obtained using a variety of other methods that include: hand augering, borehole drilling (OP GT.02), or driving a geoprobe (OP GT.22). Permitting of excavation and borehole drilling will be according to OP GT.10, Borehole Clearing.

APPENDIX G
TABLE G-2 (continued)
INVESTIGATION REQUIREMENTS AND PROPOSED ACTIONS FOR STAGE I FIELD ACTIVITIES
PIPELINES P-12, P-13, P-14, P-15
(IHSSs 123.1, 123.2, Valve Vault 7, and West of Bldg. 70)

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INTER-AGENCY AGREEMENT REQUIRED ACTION	OU9 WORK PLAN REQUIRED ACTION	OU9 PROPOSED ACTION FOR OPWL FIELD INVESTIGATION
	4. Test pits will be excavated according to the applicable portions of OP GT.7, Logging and Sampling of Test Pits and Trenches. Completion of excavation permitting procedures are described in OP GT.10, Borehole Clearing. One discrete sample will be collected in trench backfill directly beneath the pipeline and in native soil directly below trench. 5. One sample of pipeline residue will be collected where feasible. If no residue is present, one wipe sample will be collected from the interior surface of pipeline components according to OP FO.16, Field Radiological Measurements. An inside surface radiological dose rate measurement will be obtained by inserting a low energy gamma probe radiation detector into the pipeline.	If test pits are excavated, one discrete soil sample will be collected in the trench backfill directly beneath the pipeline, in native soil directly below trench and mid- depth between trench bottom and water table/bedrock. In addition, one discrete groundwater sample will be collected for each test area where feasible. One sample of the pipeline residue will also be collected where feasible. If no residue is present, one wipe sample will be collected from the interior surface of the pipeline components according to OP FO.16. An inside surface radiological dose rate measurement will be obtained by inserting a low energy gamma probe radiation detector into the pipeline. 5. If boreholes or hydraulic sampling methods are used, one discrete sample will be collected at the following locations: (a) ground surface before drilling; (b) in trench soil backfill near the bottom of the trench; (c) in native soil directly below the trench; (d) in native soil mid-depth between the trench bottom and the water table or bedrock, whichever is encountered first; (e) in bedrock at the bedrock/alluvium contact if groundwater is not encountered above the contact (i.e., where the vadose zone extends to the bedrock/alluvium contact).

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INVESTIGATION REQUIREMENTS AND PROPOSED ACTIONS FOR STAGE I FIELD ACTIVITIES
PIPELINES P-12, P-13, P-14, P-15
(IHSSs 123.1, 123.2, Valve Vault 7, and West of Bldg. 70)

INTER-AGENCY AGREEMENT REQUIRED ACTION	OU9 WORK PLAN REQUIRED ACTION	OU9 PROPOSED ACTION FOR OPWL FIELD INVESTIGATION
	6. If ground is encountered in a test pit, a groundwater grab sample will be collected according to OP SW.3, Surface Water Sampling. No attempt will be made to open pipelines and collect residue samples. The trench backfill directly below the pipeline will be sampled, if possible, but the native soil directly below the trench will not be sampled. 7. If pipeline has been physically removed, test pits will be excavated or boreholes will be drilled using a hand auger or a drilling rig. Samples will be collected from the bottom of the former pipeline trench and the native soil directly below the trench. GPR may be used to locate the alignments of these pipelines.	6. If groundwater is encountered in a test pit, a groundwater grab sample will be collected according to OP SW.3, Surface Water Sampling. If groundwater is encountered in a borehole or geoprobe, a groundwater grab sample will be collected in accordance with OP GW.06. No attempt will be made to open pipelines and collect residue samples where groundwater is present. In this instance, the trench backfill directly below the pipeline will be sampled, if possible, but the native soil directly below the trench will not be sampled. 7. In order to supplement the pipeline integrity evaluation, additional confirmation soil samples will be collected using hydraulic sampling methods (e.g., geoprobes) that will be located on 25-foot centers from one test area to the next. Soil and groundwater samples will be collected at the same target locations as described above for borehole/hydraulic sampling methods. 8. If pipeline has been physically removed, test pits will be excavated or boreholes or hydraulic sampling methods will be advanced and samples collected at the following locations: (a) ground surface before drilling; (b) in trench backfill near the bottom of the trench; (c) in native soil directly below the trench; (d) in native soil mid-depth between the trench bottom and the water table or bedrock, whichever is encountered first; (e) in bedrock at the bedrock/alluvium contact if groundwater is not encountered above the contact (i.e., where the vadose zone extends to the bedrock/alluvium contact). GPR may be used to locate the alignments of these pipelines.

APPENDIX G
TABLE G-2 (continued)
INVESTIGATION REQUIREMENTS AND PROPOSED ACTIONS FOR STAGE I FIELD ACTIVITIES
PIPELINES P-12, P-13, P-14, P-15
(IHSSs 123.1, 123.2, Valve Vault 7, and West of Bldg. 70)

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INTER-AGENCY AGREEMENT REQUIRED ACTION	OU9 WORK PLAN REQUIRED ACTION	OU9 PROPOSED ACTION FOR OPWL FIELD INVESTIGATION
	Valve Vaults 1. Valve vaults will be visually inspected to assess their integrity. 2. One residue sample or one wipe sample if no residue is present will be collected from each valve vault. In addition, a surface radiological dose rate measurement will be obtained by inserting a low energy gamma radiation probe detector into the vault in accordance with OP FO.16.	Valve Vaults 1. Valve vaults will be visually inspected to assess their integrity. 2. One residue sample or one wipe sample if no residue is present will be collected from each valve vault. In addition, a surface radiological dose rate measurement will be obtained by inserting a low energy gamma radiation probe detector into the vault in accordance with OP FO.16.

Notes:

FIDLER = Field Instrument for the Detection of Low Energy Radiation
G-M =
GPR = Ground Penetrating Radar
HPGe = high purity germanium
HSL = hazardous substance list
NaI = sodium iodide
OP = EMD Operating Procedure
OPWL = Original Process Waste Lines
OU = Operable Unit
RFI = Remedial Facility Investigation
RI = Remedial Investigation
SOP = Standard Operating Procedure

APPENDIX G
TABLE G-3
INVESTIGATION REQUIREMENTS AND PROPOSED ACTIONS FOR STAGE I FIELD ACTIVITIES
PIPELINES P-28 AND P-29
(IHSS 127, Low Level Radioactive Waste Leak)

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INTER-AGENCY AGREEMENT REQUIRED ACTION	OU9 WORK PLAN REQUIRED ACTION	OU9 PROPOSED ACTION FOR OPWL FIELD INVESTIGATION
Pipelines P-28 and P-29 (IHSS 127, Low Level Radioactive Waste Leak) 1. Conduct a radiation survey using a G-M shielded pancake detector and sideshielded FIDLER of site 127. The survey shall be conducted using 10-foot grids and will cover the entire area affected by site 127. If "hotspots" are detected, the grid must be tightened to locate the source of the radiation. If surfacing has been placed over the soils affected by releases from this site, 2-inch surface scrapes will be taken before constructing the required boreholes for this site. 2. Conduct a soil sampling survey of site 127. Place five soil borings 20 feet apart within the boundaries of the site. Collect a 2-inch surface scrape of the soils before constructing the soil borings. The surface scrape sample shall be analyzed for total plutonium, total uranium, gross alpha, gross beta, HSL metals, and total nitrate. The soil borings will extend to 10 feet below the pipe invert carrying low level waste between Buildings 995 and 774 or three feet into weathered bedrock, whichever is greater. The soil samples will be composited to represent each 2 foot increment of depth and will be analyzed for total plutonium, total uranium, gross alpha, gross beta, and total nitrate.	Pipelines 1. Where structural features are absent or widely spaced, pipeline will be located using pipeline location devices such as electrical conductance, ground-penetrating radar (GPR), transmitting sounde, and video surveys. Some pipelines will be pressure tested to determine current status of the pipeline, where possible. 2. An HPGe surface radiation survey of the surface soils will be conducted at areas where released wastes impacted surface soils according to FO.16, Field Radiological Measurements. 3. A surface soil sample will be collected from each test pit before excavating using the grab sample method as described in OP GT.8. The sample locations will be as close as possible to the center of the area to be excavated. Overlying pavement will be removed if necessary. The surface soil sample will consist of a 6-inch square area sampled to a depth of 6 inches. 4. Test pits will be excavated according to the applicable portions of OP GT.7, Logging and Sampling of Test Pits and Trenches. Completion of excavation permitting procedures are described in OP GT.10, Borehole Clearing. One discrete sample will be collected in trench backfill directly beneath the pipeline and in native soil directly below trench.	Pipelines 1. Where structural features are absent or widely spaced, pipeline will be located using pipeline location devices such as electromagnetic inductive/conductive tracing, ground-penetrating radar (GPR), transmitting sounde, video surveys and excavation of test pits. 2. An HPGe surface radiation survey of the surface soils will be conducted at areas where released wastes impacted surface soils according to FO.16, Field Radiological Measurements. A sodium iodide radiation survey will be conducted at areas indicated as "hot spots" by the HPGe survey to further delineate areas of surface contamination. 3. A surface soil sample will be collected from each test area before conducting subsurface soil sampling using the grab sample method as described in OP GT.8. The sample locations will be as close as possible to the center of the area to be investigated. Overlying pavement will be removed if necessary. 4. Test pits will be excavated according to the applicable portions of OP GT.7, Logging and Sampling of Test Pits and Trenches. If test pits are not feasible to be excavated, subsurface soil samples will be obtained using a variety of other methods that include: hand augering, borehole drilling (OP GT.02), or driving a geoprobe (OP GT.22). Permitting of excavation and borehole drilling will be according to OP GT.10, Borehole Clearing.

APPENDIX G
TABLE G-3 (continued)
INVESTIGATION REQUIREMENTS AND PROPOSED ACTIONS FOR STAGE I FIELD ACTIVITIES
PIPELINES P-28 AND P-29
(IHSS 127, Low Level Radioactive Waste Leak)

INTER-AGENCY AGREEMENT REQUIRED ACTION	OU9 WORK PLAN REQUIRED ACTION	OU9 PROPOSED ACTION FOR OPWL FIELD INVESTIGATION
	5. One sample of pipeline residue will be collected where feasible. If no residue is present, one wipe sample will be collected from the interior surface of pipeline components according to OP FO.16, Field Radiological Measurements. An inside surface radiological dose rate measurement will be obtained by inserting a low energy gamma probe radiation detector into the pipeline. 6. If ground is encountered in a test pit, a groundwater grab sample will be collected according to OP SW.3, Surface Water Sampling. No attempt will be made to open pipelines and collect residue samples. The trench backfill directly below the pipeline will be sampled, if possible, but the native soil directly below the trench will not be sampled. 7. If pipeline has been physically removed, test pits will be excavated or boreholes will be drilled using a hand auger or a drilling rig. Samples will be collected from the bottom of the former pipeline trench and the native soil directly below the trench. GPR may be used to locate the alignments of these pipelines.	If test pits are excavated, one discrete soil sample will be collected in the trench backfill directly beneath the pipeline, in native soil directly below trench and mid-depth between trench bottom and water table/bedrock. In addition, one discrete groundwater sample will be collected for each test area where feasible. One sample of the pipeline residue will also be collected where feasible. If no residue is present, one wipe sample will be collected from the interior surface of the pipeline components according to OP FO.16. An inside surface radiological dose rate measurement will be obtained by inserting a low energy gamma probe radiation detector into the pipeline. 5. If boreholes or hydraulic sampling methods are used, one discrete sample will be collected at the following locations: (a) ground surface before drilling; (b) in trench soil backfill near the bottom of the trench; (c) in native soil directly below the trench; (d) in native soil mid-depth between the trench bottom and the water table or bedrock, whichever is encountered first; (e) in bedrock at the bedrock/alluvium contact if groundwater is not encountered above the contact (i.e., where the vadose zone extends to the bedrock/alluvium contact).

APPENDIX G
TABLE G-3 (continued)
INVESTIGATION REQUIREMENTS AND PROPOSED ACTIONS FOR STAGE I FIELD ACTIVITIES
PIPELINES P-28 AND P-29
(IHSS 127, Low Level Radioactive Waste Leak)

INTER-AGENCY AGREEMENT REQUIRED ACTION	OU9 WORK PLAN REQUIRED ACTION	OU9 PROPOSED ACTION FOR OPWL FIELD INVESTIGATION
	Valve Vaults 1. Valve vaults will be visually inspected to assess their integrity. 2. One residue sample or one wipe sample if no residue is present will be collected from each valve vault. In addition, a surface radiological dose rate measurement will be obtained by inserting a low energy gamma radiation probe detector into the vault in accordance with OP FO.16.	6. If groundwater is encountered in a test pit, a groundwater grab sample will be collected according to OP SW.3, Surface Water Sampling. If groundwater is encountered in a borehole or geoprobe, a groundwater grab sample will be collected in accordance with OP GW.06. No attempt will be made to open pipelines and collect residue samples where groundwater is present. In this instance, the trench backfill directly below the pipeline will be sampled, if possible, but the native soil directly below the trench will not be sampled. 7. In order to supplement the pipeline integrity evaluation, additional confirmation soil samples will be collected using hydraulic sampling methods (e.g., geoprobes) that will be located on 25-foot centers from one test area to the next. Soil and groundwater samples will be collected at the same target locations as described above for borehole/hydraulic sampling methods. 8. If pipeline has been physically removed, test pits will be excavated or boreholes or hydraulic sampling methods will be advanced and samples collected at the following locations: (a) ground surface before drilling; (b) in trench backfill near the bottom of the trench; (c) in native soil directly below the trench; (d) in native soil mid-depth between the trench bottom and the water table or bedrock, whichever is encountered

APPENDIX G
TABLE G-3 (continued)
INVESTIGATION REQUIREMENTS AND PROPOSED ACTIONS FOR STAGE I FIELD ACTIVITIES
PIPELINES P-28 AND P-29
(IHSS 127, Low Level Radioactive Waste Leak)

INTER-AGENCY AGREEMENT REQUIRED ACTION	OU9 WORK PLAN REQUIRED ACTION	OU9 PROPOSED ACTION FOR OPWL FIELD INVESTIGATION
		first; (c) in bedrock at the bedrock/alluvium contact if groundwater is not encountered above the contact (i.e., where the vadose zone extends to the bedrock/alluvium contact). GPR may be used to locate the alignments of these pipelines. Valve Vaults 1. Valve vaults will be visually inspected to assess their integrity. 2. One residue sample or one wipe sample if no residue is present will be collected from each valve vault. In addition, a surface radiological dose rate measurement will be obtained by inserting a low energy gamma radiation probe detector into the vault in accordance with OP FO.16.

Notes:

FIDLER = Field Instrument for the Detection of Low Energy Radiation
G-M =
GPR = Ground Penetrating Radar
HPGe = high purity germanium
HSL = hazardous substance list
NaI = sodium iodide
OP = EMD Operating Procedure
OPWL = Original Process Waste Lines
OU = Operable Unit
RFI = Remedial Facility Investigation
RI = Remedial Investigation
SOP = Standard Operating Procedure

APPENDIX G
TABLE G-4
INVESTIGATION REQUIREMENTS AND PROPOSED ACTIONS FOR STAGE I FIELD ACTIVITIES
PIPELINE P-26
(IHSS 149, Effluent Pipe)

INTER-AGENCY AGREEMENT REQUIRED ACTION	OU9 WORK PLAN REQUIRED ACTION	OU9 PROPOSED ACTION FOR OPWL FIELD INVESTIGATION
Pipeline P-26 (IHSS 149, Effluent Pipe) 1. Submit the report(s) documenting the radiometric survey conducted from 1975 - 1983 and any cleanup activities for this site. 2. Submit all soil-survey information pertinent to this site acquired during the investigations of the solar ponds. 3. Conduct a radiation survey using a G-M shielded pancake detector and sideshielded FIDLER of the areas affected by site 149. The survey shall be conducted using 10-foot grids and will cover all areas affected by site 149 including the ground surfaces affected by the leakages of this line. If concrete or asphalt surfacing exists over affected soils, the surface soils shall be sampled before constructing the boreholes required for this site. If "hotspots" are detected, the grid must be tightened to locate the source of the radiation. 4. Conduct a soil sampling survey of the soils affected by site 149 using cores drilled to a depth of 5 feet below the invert of the waste line(s) that resulted in the release at this site or three feet into weathered bedrock, whichever is greater. Eleven boreholes shall be located on 50-foot centers along the downgradient side of the effluent pipe. The soil core samples shall be composited to represent 2 feet of soil. The 2-foot composite core samples will be analyzed for HSL volatiles. The soil cores shall also be composited to represent 6-foot intervals. The 6-foot cores and the surface scrapes shall be analyzed for total	Pipelines 1. Where structural features are absent or widely spaced, pipeline will be located using pipeline location devices such as electrical conductance, ground-penetrating radar (GPR), transmitting sounde, and video surveys. Some pipelines will be pressure tested to determine current status of the pipeline, where possible. 2. An HPGe surface radiation survey of the surface soils will be conducted at areas where released wastes impacted surface soils according to FO.16, Field Radiological Measurements. 3. A surface soil sample will be collected from each test pit before excavating using the grab sample method as described in OP GT.8. The sample locations will be as close as possible to the center of the area to be excavated. Overlying pavement will be removed if necessary. The surface soil sample will consist of a 6-inch square area sampled to a depth of 6 inches. 4. Test pits will be excavated according to the applicable portions of OP GT.7, Logging and Sampling of Test Pits and Trenches. Completion of excavation permitting procedures are described in OP GT.10, Borehole Clearing. One discrete sample will be collected in trench backfill directly beneath the pipeline and in native soil directly below trench.	Pipelines 1. Where structural features are absent or widely spaced, pipeline will be located using pipeline location devices such as electromagnetic inductive/conductive tracing, ground-penetrating radar (GPR), transmitting sounde, video surveys and excavation of test pits. 2. An HPGe surface radiation survey of the surface soils will be conducted at areas where released wastes impacted surface soils according to FO.16, Field Radiological Measurements. A sodium iodide radiation survey will be conducted at areas indicated as "hot spots" by the HPGe survey to further delineate areas of surface contamination. 3. A surface soil sample will be collected from each test area before conducting subsurface soil sampling using the grab sample method as described in OP GT.8. The sample locations will be as close as possible to the center of the area to be investigated. Overlying pavement will be removed if necessary. 4. Test pits will be excavated according to the applicable portions of OP GT.7, Logging and Sampling of Test Pits and Trenches. If test pits are not feasible to be excavated, subsurface soil samples will be obtained using a variety of other methods that include: hand augering, borehole drilling (OP GT.02), or driving a geoprobe (OP GT.22). Permitting of excavation and borehole drilling will be according to OP GT.10, Borehole Clearing.

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TABLE G-4 (continued)
INVESTIGATION REQUIREMENTS AND PROPOSED ACTIONS FOR STAGE I FIELD ACTIVITIES
PIPELINE P-26
(IHSS 149, Effluent Pipe)

INTER-AGENCY AGREEMENT REQUIRED ACTION	OU9 WORK PLAN REQUIRED ACTION	OU9 PROPOSED ACTION FOR OPWL FIELD INVESTIGATION
plutonium, total americium, beryllium, total chromium, tritium, total nitrate, uranium 233/234, uranium 235, uranium 238, gross alpha, gross beta, and HSL metals.	5. One sample of pipeline residue will be collected where feasible. If no residue is present, one wipe sample will be collected from the interior surface of pipeline components according to OP FO.16, Field Radiological Measurements. An inside surface radiological dose rate measurement will be obtained by inserting a low energy gamma probe radiation detector into the pipeline. 6. If ground is encountered in a test pit, a groundwater grab sample will be collected according to OP SW.3, Surface Water Sampling. No attempt will be made to open pipelines and collect residue samples. The trench backfill directly below the pipeline will be sampled, if possible, but the native soil directly below the trench will not be sampled. 7. If pipeline has been physically removed, test pits will be excavated or boreholes will be drilled using a hand auger or a drilling rig. Samples will be collected from the bottom of the former pipeline trench and the native soil directly below the trench. GPR may be used to locate the alignments of these pipelines. Valve Vaults 1. Valve vaults will be visually inspected to assess their integrity. 2. One residue sample or one wipe sample if no residue is present will be collected from each valve vault. In addition, a surface radiological dose rate	If test pits are excavated, one discrete soil sample will be collected in the trench backfill directly beneath the pipeline, in native soil directly below trench and mid-depth between trench bottom and water table/bedrock. In addition, one discrete groundwater sample will be collected for each test area where feasible. One sample of the pipeline residue will also be collected where feasible. If no residue is present, one wipe sample will be collected from the interior surface of the pipeline components according to OP FO.16. An inside surface radiological dose rate measurement will be obtained by inserting a low energy gamma probe radiation detector into the pipeline. 5. If boreholes or hydraulic sampling methods are used, one discrete sample will be collected at the following locations: (a) ground surface before drilling; (b) in trench soil backfill near the bottom of the trench; (c) in native soil directly below the trench; (d) in native soil mid-depth between the trench bottom and the water table or bedrock, whichever is encountered first; (e) in bedrock at the bedrock/alluvium contact if groundwater is not encountered above the contact (i.e., where the vadose zone extends to the bedrock/alluvium contact). 6. If groundwater is encountered in a test pit, a groundwater grab sample will be collected according to OP SW.3, Surface Water Sampling. If groundwater is encountered in a borehole or geoprobe, a groundwater grab sample will be collected in accordance with OP GW.06. No attempt

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TABLE G-4 (continued)
INVESTIGATION REQUIREMENTS AND PROPOSED ACTIONS FOR STAGE I FIELD ACTIVITIES
PIPELINE P-26
(IHSS 149, Effluent Pipe)

INTER-AGENCY AGREEMENT REQUIRED ACTION	OU9 WORK PLAN REQUIRED ACTION	OU9 PROPOSED ACTION FOR OPWL FIELD INVESTIGATION
		pipeline will be sampled, if possible, but the native soil directly below the trench will not be sampled. 7. In order to supplement the pipeline integrity evaluation, additional confirmation soil samples will be collected using hydraulic sampling methods (e.g., geoprobes) that will be located on 25-foot centers from one test area to the next. Soil and groundwater samples will be collected at the same target locations as described above for borehole/hydraulic sampling methods: [illegible] 8. If pipeline has been physically removed, test pits will be excavated or boreholes or hydraulic sampling methods will be advanced and samples collected at the following locations: (a) ground surface before drilling; (b) in trench backfill near the bottom of the trench; (c) in native soil directly below the trench; (d) in native soil mid-depth between the trench bottom and the water table or bedrock, whichever is encountered first; (e) in bedrock at the bedrock/alluvium contact if groundwater is not encountered above the contact (i.e., where the vadose zone extends to the bedrock/alluvium contact). GPR may be used to locate the alignments of these pipelines.

APPENDIX G
TABLE G-4 (continued)
INVESTIGATION REQUIREMENTS AND PROPOSED ACTIONS FOR STAGE I FIELD ACTIVITIES
PIPELINE P-26
(IHSS 149, Effluent Pipe)

INTER-AGENCY AGREEMENT REQUIRED ACTION	OU9 WORK PLAN REQUIRED ACTION	OU9 PROPOSED ACTION FOR OPWL FIELD INVESTIGATION
		Valve Vaults 1. Valve vaults will be visually inspected to assess their integrity. 2. One residue sample or one wipe sample if no residue is present will be collected from each valve vault. In addition, a surface radiological dose rate measurement will be obtained by inserting a low energy gamma radiation probe detector into the vault in accordance with OP FO.16.

Notes:

FIDLER = Field Instrument for the Detection of Low Energy Radiation
G-M =
GPR = Ground Penetrating Radar
HPGe = high purity germanium
HSL = hazardous substance list
NaI = sodium iodide
OP = EMD Operating Procedure
OPWL = Original Process Waste Lines
OU = Operable Unit
RFI = Remedial Facility Investigation
RI = Remedial Investigation
SOP = Standard Operating Procedure

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APPENDIX G
TABLE G-5
INVESTIGATION REQUIREMENTS AND PROPOSED ACTIONS FOR STAGE I FIELD ACTIVITIES
PIPELINE P-17
(IHSS 159, Radioactive Site - Bldg. 559)

INTER-AGENCY AGREEMENT REQUIRED ACTION	OU9 WORK PLAN REQUIRED ACTION	OU9 PROPOSED ACTION FOR OPWL FIELD INVESTIGATION
Pipeline P-17 (IHSS 159, Radioactive Site - Bldg 559) 1. Submit the report(s) documenting the radiometric survey conducted from 1975 - 1983 and any cleanup activities for this site. 2. Conduct a radiation survey using a G-M shielded pancake detector and sideshielded FIDLER of the areas affected by site 159. The survey shall be conducted using 10-foot grids and will cover all the areas affected by site 159. If "hotspots" are detected, the grid must be tightened to locate the source of the radiation. 3. Conduct a soil sampling survey of the soils affected by site 159 using cores drilled to a depth of 5 feet below the invert of the waste line(s) or 3 feet into weathered bedrock, whichever is deeper. Borehole core samples will be composited to represent 2 feet of soil. The 2- foot composites shall be analyzed for HSL volatiles. Borehole core samples shall also be composited to represent 6-foot intervals of soil. The 2-inch surface scrapes and the 6-foot composites shall be analyzed for total plutonium, total americium, beryllium, total chromium, tritium, total nitrate, uranium 233/234, uranium 235, uranium 238, gross alpha, gross beta, and HSL metals. Two-inch surface scrapes shall be sampled before constructing all boreholes and where surfacing exists to prevent the radiation survey.	Pipelines 1. Where structural features are absent or widely spaced, pipeline will be located using pipeline location devices such as electrical conductance, ground-penetrating radar (GPR), transmitting sounde, and video surveys. Some pipelines will be pressure tested to determine current status of the pipeline, where possible. 2. An HPGe surface radiation survey of the surface soils will be conducted at areas where released wastes impacted surface soils according to FO.16, Field Radiological Measurements. 3. A surface soil sample will be collected from each test pit before excavating using the grab sample method as described in OP GT.8. The sample locations will be as close as possible to the center of the area to be excavated. Overlying pavement will be removed if necessary. The surface soil sample will consist of a 6 inch square area sampled to a depth of 6 inches. 4. Test pits will be excavated according to the applicable portions of OP GT.7, Logging and Sampling of Test Pits and Trenches. Completion of excavation permitting procedures are described in OP GT.10, Borehole Clearing. One discrete sample will be collected in trench backfill directly beneath the pipeline and in native soil directly below trench.	Pipelines 1. Where structural features are absent or widely spaced, pipeline will be located using pipeline location devices such as electromagnetic inductive/conductive tracing, ground-penetrating radar (GPR), transmitting sounde, video surveys and excavation of test pits. 2. An HPGe surface radiation survey of the surface soils will be conducted at areas where released wastes impacted surface soils according to FO.16, Field Radiological Measurements. A sodium iodide radiation survey will be conducted at areas indicated as "hot spots" by the HPGe survey to further delineate areas of surface contamination. 3. A surface soil sample will be collected from each test area before conducting subsurface soil sampling using the grab sample method as described in OP GT.8. The sample locations will be as close as possible to the center of the area to be investigated. Overlying pavement will be removed if necessary. 4. Test pits will be excavated according to the applicable portions of OP GT.7, Logging and Sampling of Test Pits and Trenches. If test pits are not feasible to be excavated, subsurface soil samples will be obtained using a variety of other methods that include: hand augering, borehole drilling (OP GT.02), or driving a geoprobe (OP GT.22). Permitting of excavation and borehole drilling will be according to OP GT.10, Borehole Clearing.

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APPENDIX G
TABLE G-5 (continued)
INVESTIGATION REQUIREMENTS AND PROPOSED ACTIONS FOR STAGE I FIELD ACTIVITIES
PIPELINE P-17
(IHSS 159, Radioactive Site - Bldg. 559)

INTER-AGENCY AGREEMENT REQUIRED ACTION	OU9 WORK PLAN REQUIRED ACTION	OU9 PROPOSED ACTION FOR OPWL FIELD INVESTIGATION
	5. One sample of pipeline residue will be collected where feasible. If no residue is present, one wipe sample will be collected from the interior surface of pipeline components according to OP FO.16, Field Radiological Measurements. An inside surface radiological dose rate measurement will be obtained by inserting a low energy gamma probe radiation detector into the pipeline. 6. If ground is encountered in a test pit, a groundwater grab sample will be collected according to OP SW.3, Surface Water Sampling. No attempt will be made to open pipelines and collect residue samples. The trench backfill directly below the pipeline will be sampled, if possible, but the native soil directly below the trench will not be sampled. 7. If pipeline has been physically removed, test pits will be excavated or boreholes will be drilled using a hand auger or a drilling rig. Samples will be collected from the bottom of the former pipeline trench and the native soil directly below the trench. GPR may be used to locate the alignments of these pipelines.	If test pits are excavated, one discrete soil sample will be collected in the trench backfill directly beneath the pipeline, in native soil directly below trench and mid-depth between trench bottom and water table/bedrock. In addition, one discrete groundwater sample will be collected for each test area where feasible. One sample of the pipeline residue will also be collected where feasible. If no residue is present, one wipe sample will be collected from the interior surface of the pipeline components according to OP FO.16. An inside surface radiological dose rate measurement will be obtained by inserting a low energy gamma probe radiation detector into the pipeline. 5. If boreholes or hydraulic sampling methods are used, one discrete sample will be collected at the following locations: (a) ground surface before drilling; (b) in trench soil backfill near the bottom of the trench; (c) in native soil directly below the trench; (d) in native soil mid-depth between the trench bottom and the water table or bedrock, whichever is encountered first; (e) in bedrock at the bedrock/alluvium contact if groundwater is not encountered above the contact (i.e., where the vadose zone extends to the bedrock/alluvium contact).

APPENDIX G
TABLE G-5 (continued)
INVESTIGATION REQUIREMENTS AND PROPOSED ACTIONS FOR STAGE I FIELD ACTIVITIES
PIPELINE P-17
(IHSS 159, Radioactive Site - Bldg. 559)

INTER-AGENCY AGREEMENT REQUIRED ACTION	OU9 WORK PLAN REQUIRED ACTION	OU9 PROPOSED ACTION FOR OPWL FIELD INVESTIGATION
	Valve Vaults 1. Valve vaults will be visually inspected to assess their integrity. 2. One residue sample or one wipe sample if no residue is present will be collected from each valve vault. In addition, a surface radiological dose rate measurement will be obtained by inserting a low energy gamma radiation probe detector into the vault in accordance with OP FO.16.	6. If groundwater is encountered in a test pit, a groundwater grab sample will be collected according to OP SW.3, Surface Water Sampling. If groundwater is encountered in a borehole or geoprobe, a groundwater grab sample will be collected in accordance with OP GW.06. No attempt will be made to open pipelines and collect residue samples where groundwater is present. In this instance, the trench backfill directly below the pipeline will be sampled, if possible, but the native soil directly below the trench will not be sampled. 7. In order to supplement the pipeline integrity evaluation, additional confirmation soil samples will be collected using hydraulic sampling methods (e.g., geoprobes) that will be located on 25-foot centers from one test area to the next. Soil and groundwater samples will be collected at the same target locations as described above for borehole/hydraulic sampling methods. 8. If pipeline has been physically removed, test pits will be excavated or boreholes or hydraulic sampling methods will be advanced and samples collected at the following locations: (a) ground surface before drilling; (b) in trench backfill near the bottom of the trench; (c) in native soil directly below the trench; (d) in native soil mid-depth between the trench bottom and the water table or bedrock, whichever is encountered first; (e) in bedrock at the bedrock/alluvium contact if groundwater is not encountered above the contact (i.e., where the vadose zone extends to the bedrock/alluvium contact). GPR may be used to locate the alignments of these pipelines.

APPENDIX G
TABLE G-5 (continued)
INVESTIGATION REQUIREMENTS AND PROPOSED ACTIONS FOR STAGE I FIELD ACTIVITIES
PIPELINE P-17
(IHSS 159, Radioactive Site - Bldg. 559)

INTER-AGENCY AGREEMENT REQUIRED ACTION	OU9 WORK PLAN REQUIRED ACTION	OU9 PROPOSED ACTION FOR OPWL FIELD INVESTIGATION
		Valve Vaults 1. Valve vaults will be visually inspected to assess their integrity. 2. One residue sample or one wipe sample if no residue is present will be collected from each valve vault. In addition, a surface radiological dose rate measurement will be obtained by inserting a low energy gamma radiation probe detector into the vault in accordance with OP FO.16.

Notes:

FIDLER = Field Instrument for the Detection of Low Energy Radiation
G-M =
GPR = Ground Penetrating Radar
HPGe = high purity germanium
HSL = hazardous substance list
NaI = sodium iodide
OP = EMD Operating Procedure
OPWL = Original Process Waste Lines
OU = Operable Unit
RFI = Remedial Facility Investigation
RI = Remedial Investigation
SOP = Standard Operating Procedure